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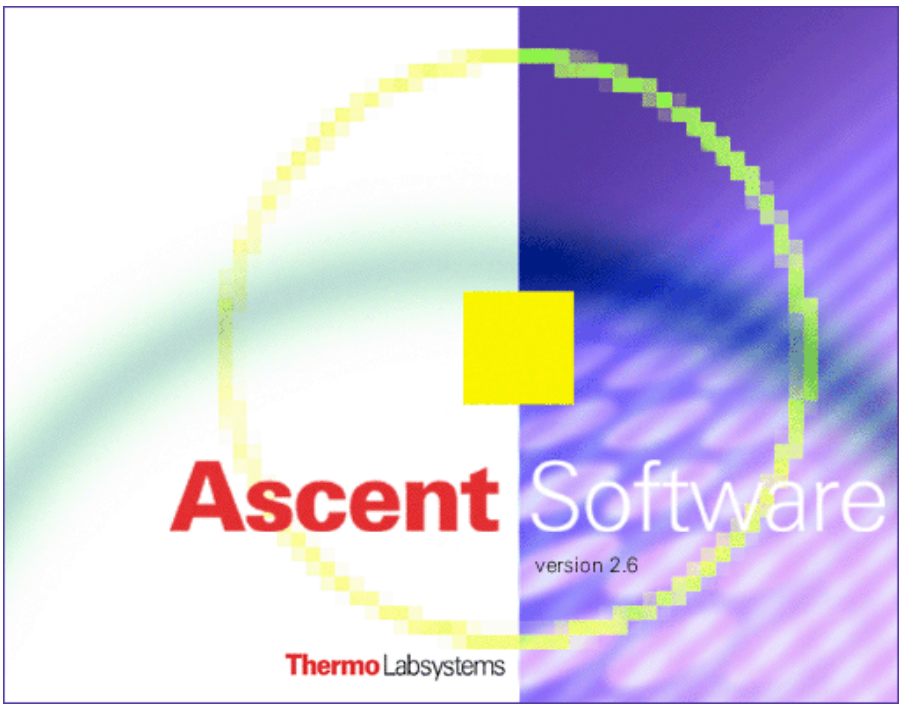

for

Fluoroskan Ascent®, Fluoroskan Ascent® FL & Fluoroskan Ascent® CF

User's Guide

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Software version 2.6
Revision 3.0, Mar. 2002
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1 Overview

1.1 Introduction

Ascent Software is a powerful application which controls the Fluoroskan Ascent FL, a combined fluorometer and luminometer, and the Fluoroskan Ascent and Fluoroskan Ascent CF fluorometers. Note that this User's Guide describes functions of all these readers. Reader functions that apply only to the Fluoroskan Ascent FL are marked as "FL only".

Note that all the functions for the Fluoroskan Ascent described in this User's Guide also apply to the Fluoroskan Ascent CF with the exception of all information on dispensers and dispensing (marked as "not CF").

Ascent Software provides features needed to make comprehensive calculations and reports. You can define and run a variety of plates easily. A plate information database covers the most common plate formats. Ascent Software allows you to build your own applications and to run or modify ready-made applications. Designing an own application is easy. In the special graphical **Procedure Desktop** you can simply drag the assay steps from the toolbox into the Steplist. You can define measurement, shaking, dispensing and incubation parameters. On the **Results Desktop** you can define spreadsheets to perform calculations and to create impressive reports. All the application data can be recalled, executed and saved with a click of the mouse.

Ascent Software provides:

- Full support for both fluorometric and luminometric measurements (FL only).
- A template database for the most common 1- to 384-well plates.
- A template editor for the user to define plate templates.
- A variety of options to select measurement points in a well.
- A drag-and-drop technique to define the procedure steps to the Steplist.
- Simultaneous measuring and dispensing.
- A flexible spreadsheet type environment for calculations and reports.
- A session management system.
- Runtime Screens during execution.
- Graph functions to generate graphical presentation of data.
- A Function tool to easily create custom-made formulas.
- A Curve Fit tool to create calibrator curves and to calculate sample concentrations.
- A Cut-Off tool to create various cut-off sheets.
- Kinetic processors.

1.2 Product support

For any questions about Ascent Software, contact your local Thermo Labsystems distributor.

When you contact the distributor, be prepared to give the following information:

- Version number and serial number of your Ascent Software
- Instrument internal software version (EPROM)
- The type of environment that you are using
    - Windows version number (and language)
    - Computer name and model
    - Processor type
    - Physical RAM in MB
    - Video resolution, colors and card type
- The exact wording of any messages that appeared on your screen
- What happened and what you were doing when the problem occurred
- How you tried to solve the problem
- The Instrument Status report
- Instrument serial number
- Options installed in your instrument.

1.3 Getting started

1.3.1 System hardware requirements

The following equipment is required to run the program:

- IBM PC-compatible computer with Pentium processor
- SVGA 1024 x 768 display
- 64 MB of free RAM available
- 200 MB of free hard disk space available
- CD-ROM drive
- Parallel port for the printer
- Windows-compatible printer
- Windows-compatible mouse port (or second serial port) and mouse
- Free serial port for the instrument, buffered (16550AF).

The printer is a standard printer that can be configured to the Windows system. The printer is connected to the computer via the Centronics parallel port (LPT1 or LPT2).

1.3.2 Instrument hardware requirements

Check that the embedded software (EPROM) is compatible with the Ascent Software version.

Note: Problems with the version string will arise if the EPROM in the instrument is of an older version. The EPROM must then be replaced. With an older EPROM you might get connected to the instrument, but the instrument will not necessarily operate correctly. Use only EPROM version 2.5 with Ascent Software version 2.6.

1.3.3 Software requirements

One of the following versions of the operating systems is required:

- Windows 98
- Windows Me
- Windows NT 4.0 workstation.

Note: The installation must be carried out through the workstation, not through the server.

- Windows 2000.

Note: Tool tips must be disabled before installation in Windows 2000.

Note:

- DO NOT use any directory names more than eight characters long. Ascent Software does not support long directory names.
- DO NOT use any nonstandard characters in Ascent Software.
- DO NOT use a dot character in the directory name. The dot character is reserved for the extension.

Note: It is not possible to have two pieces of Ascent Software operating at the same time, except in Windows NT where "Run in Separate Memory Space" can be selected.

1.3.4 Before installation

Please follow the following instructions for carefree installation of the software.

1.3.4.1 Microsoft Windows language settings

It is recommended that the operating system language is set to English (United States) or English (United Kingdom) before installation of Ascent Software as Ascent Software has been only tested in the English (US) environment.

The language settings can be checked and changed in the **Regional Settings** window (*Windows 98*, *Windows Me*, and *Windows NT*) or in the **Regional Options** window (*Windows 2000*):

Language settings in Windows 98, Windows Me, and Windows NT:

Start → Settings → Control Panel → Regional Settings → English

Language settings in Windows 2000:

Start → Settings → Control Panel → Regional Options → General → English

1.3.4.2 Letters permitted with Ascent Software installation

It is only allowed to use the letters a to z and A to Z with Ascent Software. Scandinavian letters (å, ä, ö, æ, ø, etc.) or any other non-standard letters should not be used with Ascent Software.

1.3.4.3 Printer settings

Printer default settings should be carried out from the **Start → Settings → Printers** window and then **Printer Properties** (icon) prior to starting Ascent Software.

1.3.5 Installation of Ascent Software

Ascent Software is distributed on CDs.

To install:

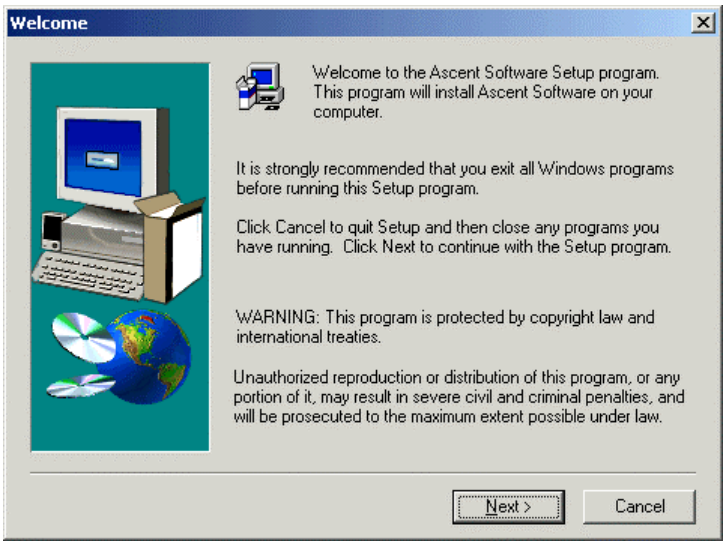
1. Exit all open applications and insert the CD into your CD-ROM drive. If the installation program does not automatically run, perform the following steps.

2. Click the **Start** button and select **Run**.

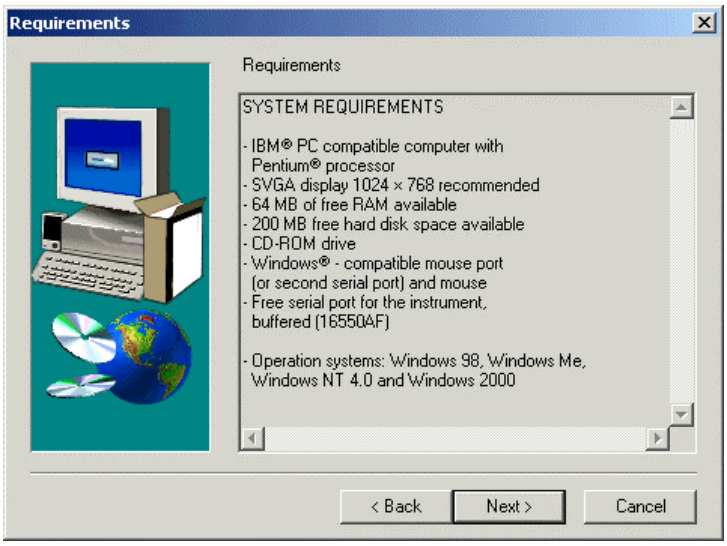
3. In the **Open** box, type your CD-ROM drive letter and then type \setup. For example, E:\setup.

4. Click **OK** and follow the on-screen prompts to complete the installation.

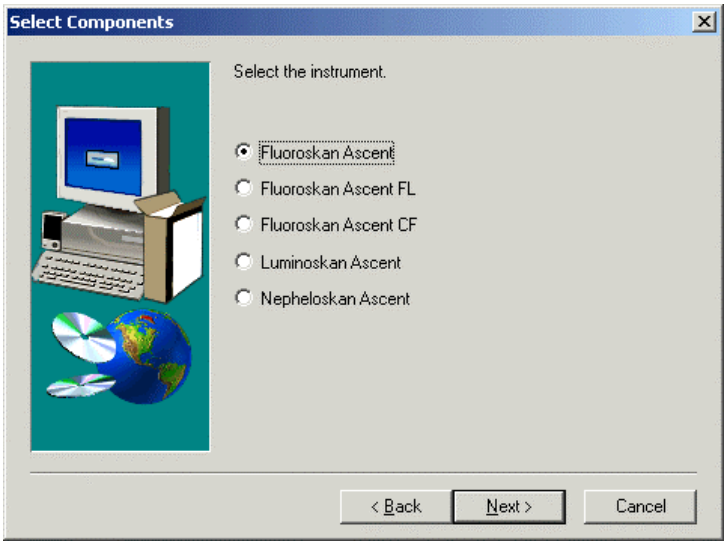
The SETUP first copies its setup files to your hard disk. It searches for a location on the user's hard disk to copy its temporary files. If the SETUP finds a workable temporary location, it starts running the installation procedure.


Welcome
Welcome to the Ascent Software Setup program. This program will install Ascent Software on your computer.
It is strongly recommended that you exit all Windows programs before running this Setup program.
Click Cancel to quit Setup and then close any programs you have running. Click Next to continue with the Setup program.
WARNING: This program is protected by copyright law and international treaties.
Unauthorized reproduction or distribution of this program, or any portion of it, may result in severe civil and criminal penalties, and will be prosecuted to the maximum extent possible under law.
Next >
Cancel

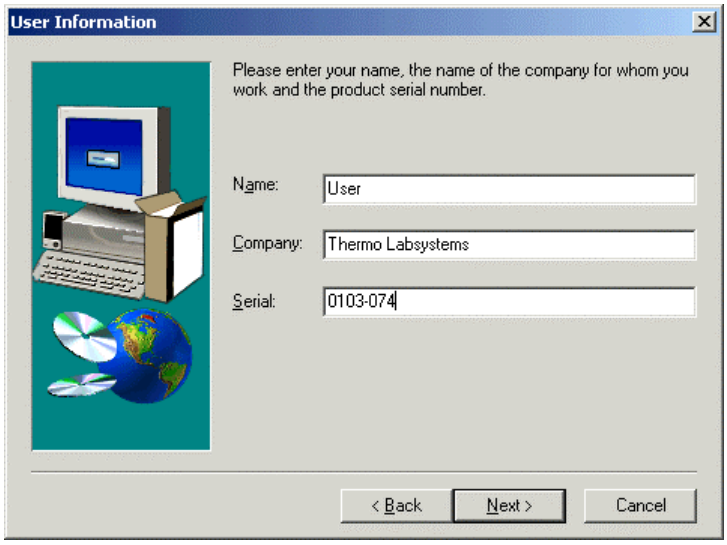
The installation procedure will prompt the following recommended computer requirements.


Requirements
Requirements
SYSTEM REQUIREMENTS
- IBM® PC compatible computer with Pentium® processor
- SVGA display 1024 x 768 recommended
- 64 MB of free RAM available
- 200 MB free hard disk space available
- CD-ROM drive
- Windows® - compatible mouse port (or second serial port) and mouse
- Free serial port for the instrument, buffered (16550AF)
- Operation systems: Windows 98, Windows Me, Windows NT 4.0 and Windows 2000
< Back
Next >
Cancel

The next dialog allows the selection of the instrument type:



Then user information is requested:

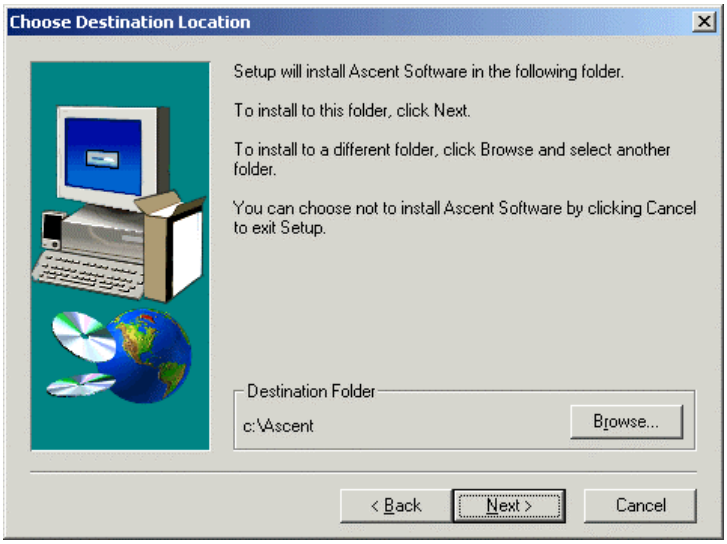


The serial number can be found on the CD cover.

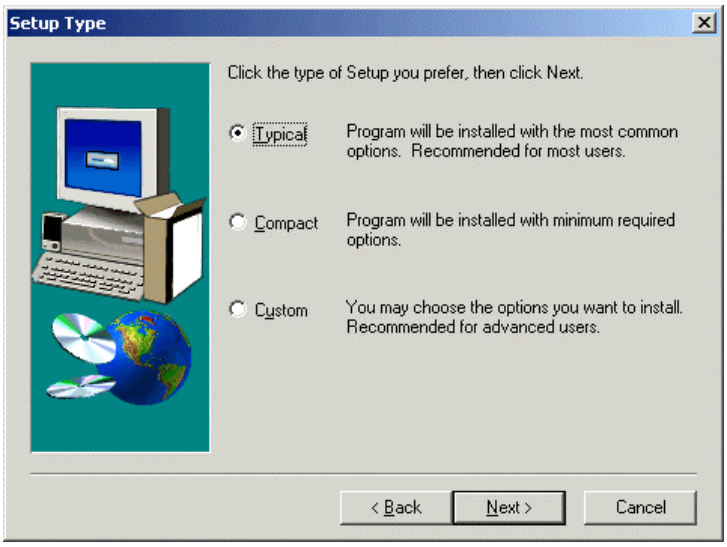
The destination folder is where you want Ascent Software installed. As default, this will be installed into C:\Ascent. You can change the path by using the **Browse**... button. A new directory can be created by typing in a new directory name.

Note

- DO NOT use any directory names more than eight characters long. Ascent Software does not support long directory names.
- DO NOT use any nonstandard characters in Ascent Software.
- DO NOT use a dot character in the directory name. The dot character is reserved for the extension.


Choose Destination Location
Setup will install Ascent Software in the following folder.
To install to this folder, click Next.
To install to a different folder, click Browse and select another folder.
You can choose not to install Ascent Software by clicking Cancel to exit Setup.
Destination Folder
c:\Ascent
Browse...
< Back
Next >
Cancel

Next you can select the installation Setup Type:

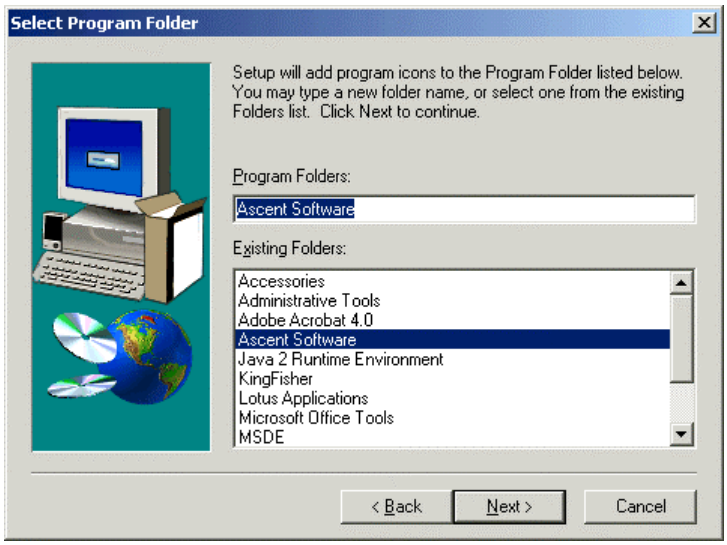

Setup Type
Click the type of Setup you prefer, then click Next.
Typical
Program will be installed with the most common options. Recommended for most users.
Compact
Program will be installed with minimum required options.
Custom
You may choose the options you want to install. Recommended for advanced users.
< Back
Next >
Cancel

Typical:
A complete installation

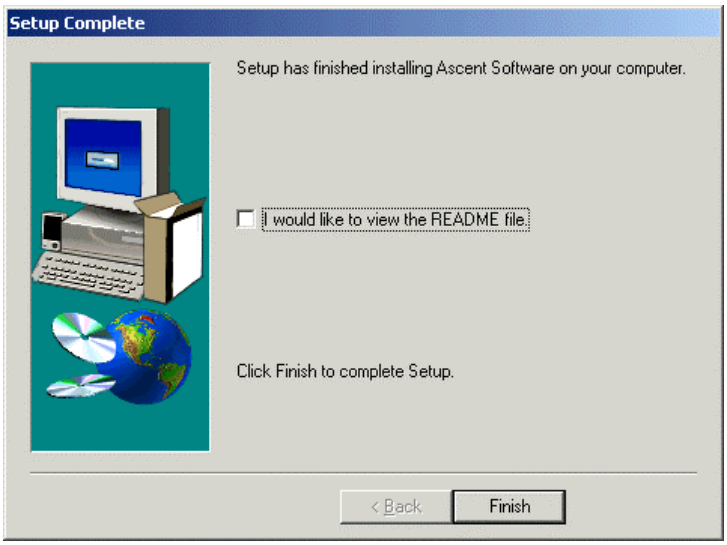
Compact:
No session files installed. No help files installed.

Custom:
You may choose what components are installed; program files, help files, and/or session files.

The next dialog allows the selection or the addition of a program folder:



The installation is completed with the following dialog box:


Setup Complete
Setup has finished installing Ascent Software on your computer.
I would like to view the README file.
Click Finish to complete Setup.
< Back
Finish

The icon/shortcut is generated automatically onto the desktop.

1.3.6 Instrument setup

The Instrument Setup allows the user to configure the Ascent Software settings, Instrument settings and the Startup settings.

The following options are available in the **Setup** menu on the **Procedure Desktop**:

- **Plate Templates.** The user can edit plate templates.
- **Filters.** The user can modify filter settings.
- **Password.** The user can add and change the system password.
- **Dispensers.** The user can set the dispenser options.
- **Colors.** The user can define the colors for the different well types.
- **Printout.** The user can define the printout options.

- **Instrument Status.** The user can retrieve information on the Instrument Status.

Settings in the **General** step on the **Procedure Desktop** include Instrument and Dispenser settings:

- **Instrument settings.** The user can set instrument parameters.

- **Dispenser settings.** The user can set dispensing speeds.

For more information, see **General** step **Settings** on p. 1-26.

1.3.7 Instrument communication

Ascent Software controls the instrument via the serial interface (COM1…COM4) RS-232C. The baud rate is 9600. The character format is 1 start bit, 8 data bits, 1 stop bit and no parity with XON/XOFF handshaking. The above-mentioned communication settings are carried out automatically.

1.3.8 Dispensers

The dispenser units (from 0 to 3) are connected to the instrument via the serial interface (not CF).

1.3.9 Filter Pair validation

The validation process is executed in the following main steps:

- Select **Filters** from the **Setup** menu.
- Add the fluorometric filter pair by entering the filter positions and wavelengths (**Add → Start**) or select an existing filter pair and then press **Validate**.

The instrument selects the filters and measures all the reference chips.

After the measurements the instrument selects a suitable reference chip value and attaches it to the filter pair to be validated. The calculated correction coefficient is saved within the instrument. In the autocalibration procedure, the instrument is validated against the selected reference chip and the correction coefficient is used to compensate for the degradation of the optical system, if necessary. Refer to the instrument manual for more information.

If a suitable reference chip is not found, the program displays a message for the user to accept or to cancel using this filter pair.

Note: Filter setup is required before using the instrument. Ensure the filters in **Setup → Filters** are exactly the same and exactly in the same positions as in the filter wheel.

1.3.10 Password

The program contains a password system, which can be switched on or off in **Setup → Password**. The password is requested once the program is started:

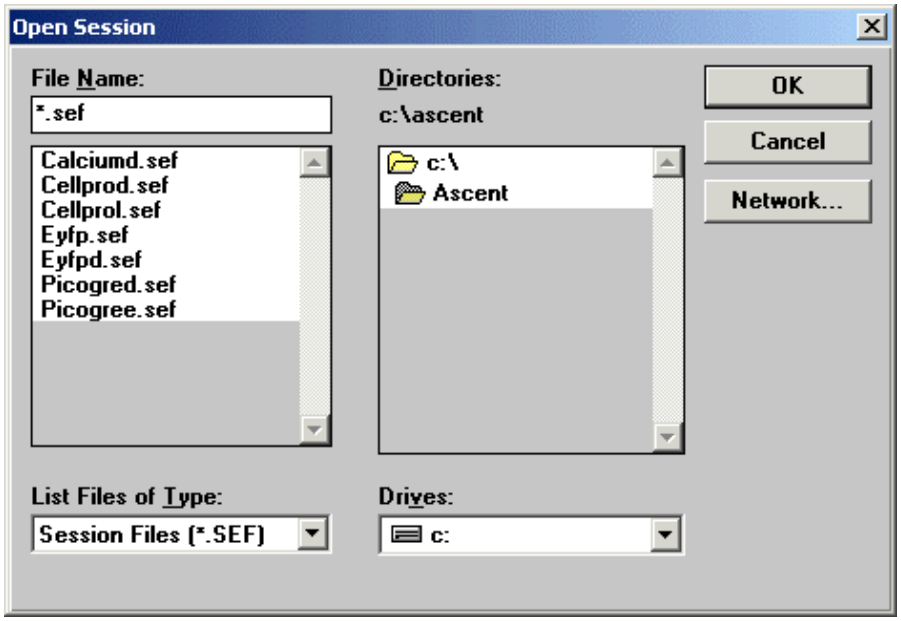
There is one password for the program, which can be changed by the user. The given password is cryptic (for more information, see Section **Setup|Password** in the **Procedure Desktop** part of the manual). If the password is accepted, the program starts.

1.3.11 Quick start

When the program is started, it is possible to press the **Start** button immediately. The **Start** button starts the measurement of a 96-well plate (Default session) and gives the results.

1.3.12 Opening Sessions

The **Session → Open...** command on the **Procedure Desktop** displays the **Open Session** dialog box where you can select and load an existing session file:



- **File Name.** Select or type the name of the Session you want to open. The fixed extension of the filename is ***.sef** for the Fluoroskan Ascent and Fluoroskan Ascent CF, and ***.sec** for the Fluoroskan Ascent FL. The Fluoroskan Ascent FL can, however, read ***.sec**, ***.sef**, and ***.sel** (Luminoskan Ascent luminometric file) files, but only save them as ***.sec** files.
- **Drives.** Select the drive in which the program stores the Session you want to open.

- **Directories.** Select the directory in which the program stores the Session you want to open.

1.3.13 Example Sessions

Some ready-made example sessions are supplied with the program. When the program is installed, the default session is loaded. It contains definitions for measuring a 96-well plate.

The session information contains:

- desktop information
- procedure information
- results information.

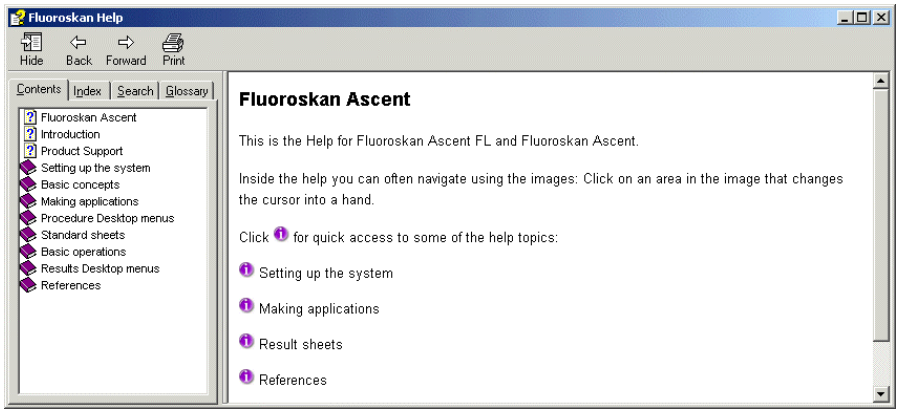
1.3.14 Creating a new Session

You can create a new application by creating a new Session. The session is based on a template. The program is supplied with the most common 1- to 384 (864 with limitations)-well plate templates. You can always create your own templates by using the Template Editor (for more information, see *Creating your own Session* on p. 1-42).

1.3.15 Using Help

You can launch the Help application by selecting **Help → Help Contents** from the main menu.

The following **Help** window will appear.



The Help main menu buttons are:

- **Hide**. Hides the left-hand side navigation window. To display the navigation window again, click the **Show** button that appears instead of the **Hide** button.
- **Back**. Takes you back to the previous view in your view history.
- **Forward**. Takes you to the next view in your view history.
- **Print**. Prints a single topic or multiple topics.

You can access the help content in three different ways by selecting one of the following tabs:

- **Contents**. Browse the help topics by subject.
- **Index**. Type in a keyword or browse all keywords to find a specific topic.

- **Search**. Find a specific help topic by entering words to search in the help content.

Note: Many images in the help application contain links to topics. When you see an image, move the cursor across the image to find the links.

1.4 Configuration

The **Setup** menu is used when the configuration of one of the following parts of the system is changed:

- Plate Templates
- Instrument - filter parameters
- Passwords - starting the password system and changing passwords
- Dispenser Setup
- Colors
- Printout Setup.

Dispenser Setup

The **Execute** menu contains tools which are needed when the dispenser units are primed or emptied.

1.5 Basic concepts

1.5.1 Session

The program is based on sessions. A session contains a plate template, a measurement/dispensing area, a plate layout, steps and calculation information defined by the user. The user can create a new, save the current and load an old session. Only one session can be loaded at a time. When a new session is created, the type of plate template is requested. This template selection defines the dimensions of the plate and wells. The user can enter the well specification with the plate layout. Layouts can be saved as files and layouts can be loaded from files to the sessions. In the **Area definition** window, the user can select the wells to be measured.

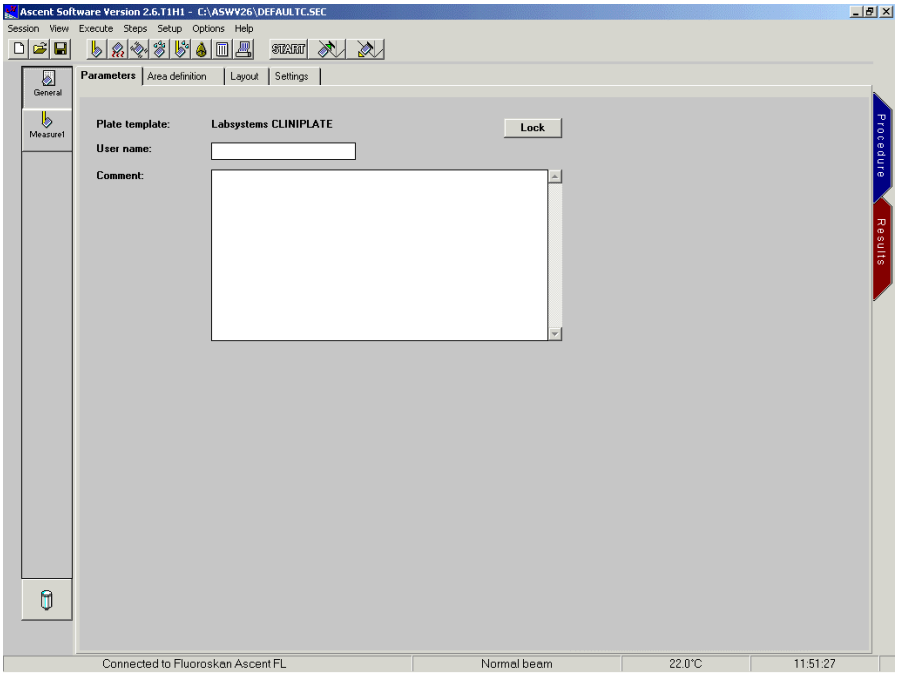
1.5.2 Desktops

The Desktop is the main window area of the program. There are two desktops available: **Procedure Desktop**, and **Results Desktop**.

1.5.3 Procedure Desktop

With the means of the **Procedure Desktop** module, the user can define session steps. **Steps** is a collection of basic operations, which are executed for the defined area at a certain time.

When a new Session is created, the user is requested to select a plate template which is based on predefined well parameters and point locations. The creation of new areas and steps is based on this template selection.



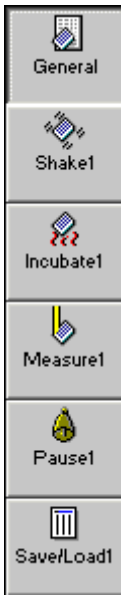
The step parameters are requested in the **Parameters** entry area. The area definition, settings and layout of the **General** step are applied to the whole session. However, every measurement and dispense step may have its own area definition, settings and layout. The areas are modified by using the area definition. The layouts are modified by using the layout editor.

1.5.4 Steplist

The Steplist is a collection of all the Steps defined for a session. You can add and delete steps from the Steplist. The Steplist has a vertical scroll bar for viewing the Steps with the mouse. The scroll bar is displayed when the steps do not fit completely in the window. The scroll bar is located to the right of the Steplist. You can also add or remove an active step from the Steplist by using the right mouse button in the Steplist area.

The order of the Steps can be changed by “drag-and-drop”: Select a Step, keep the mouse button down, move the Step icon to a new location in the Steplist and release the mouse button.

Steplist:



1.5.5 Steps

Steps is a collection of basic operations that are performed in a certain sequence. You can/have to designate each step with a specific name. The step parameters are requested in the **Parameters** entry area. For Fluoroskan Ascent FL the measurement method (luminometric or fluorometric) can be defined for each measurement step. Every measurement and dispense step may have a specific area definition, settings and plate layout. In that case you have to click **Overwrite general step settings** and define the area, settings and layout.

The Steps are:

General

Measure

Dispense

Dispense And Measure

Incubate

Shake

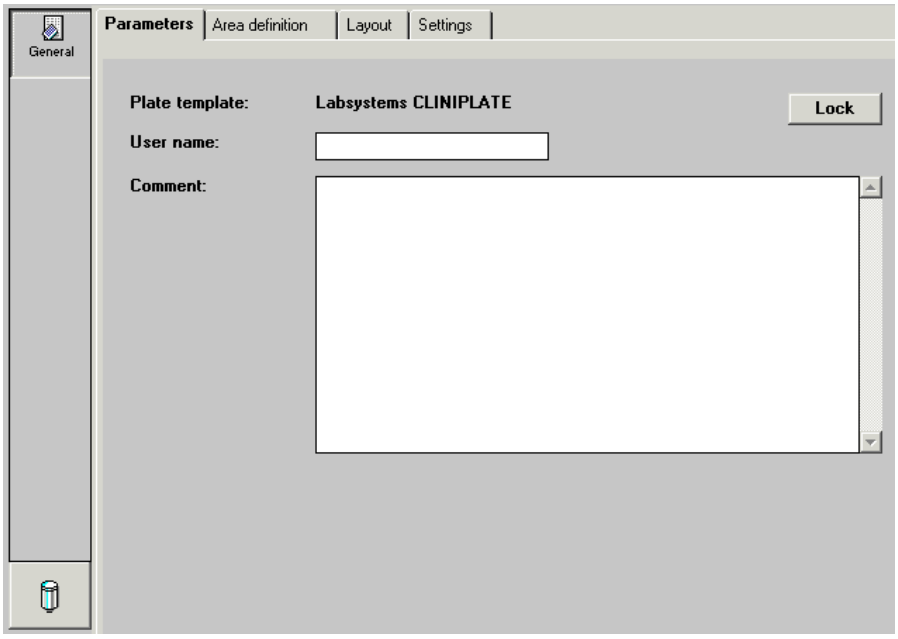
Pause

Save/Load

Print

1.5.5.1 General step

The **General** step is always the first step in the Steplist. The **General** step defines the values for the common parameters of all the steps.

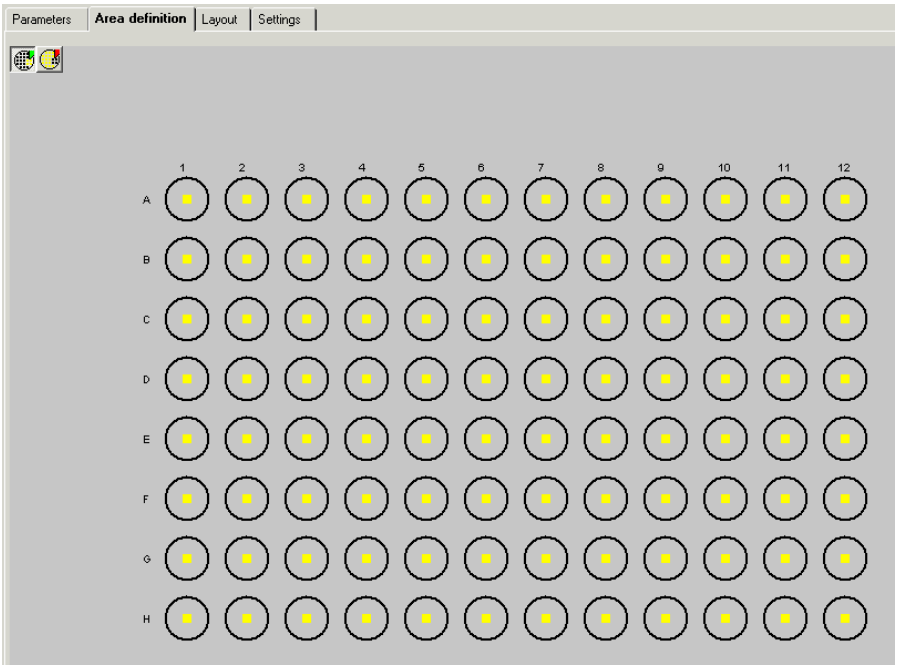


- **Plate template.** The selected plate template.
- **User name.** The name of the user.
- **Comment.** A general comment.
- **Lock.** A session-specific password can be added.

All the common parameters are printed in the worksheet named **"Steps"** on the **Results Desktop**.

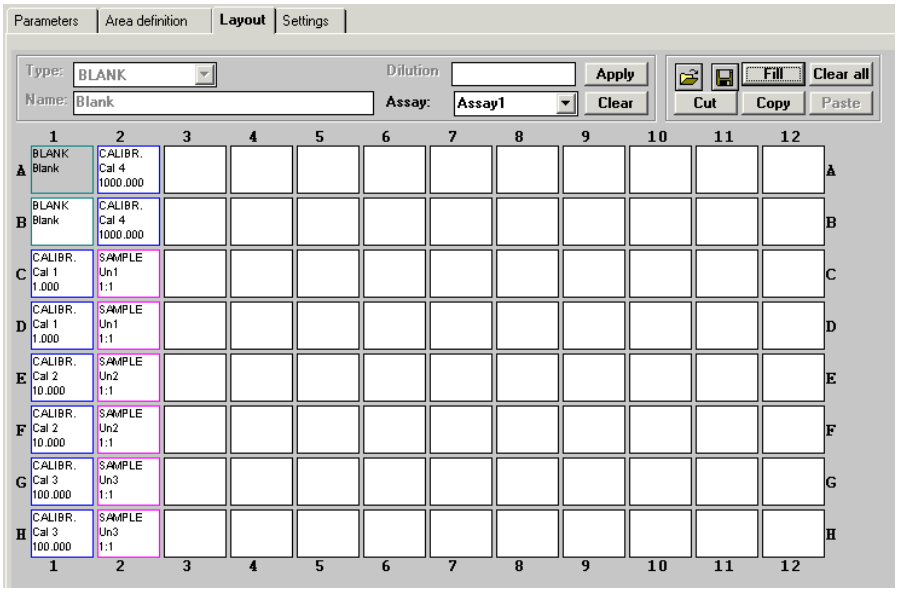
1.5.5.1.1 Area definition

You can define the area for the measurement and dispense steps. The measurement wells can be selected from a variety of options. For more information, see **Area definition** on p. 1-30 and in the **Procedure Desktop** part of the manual.

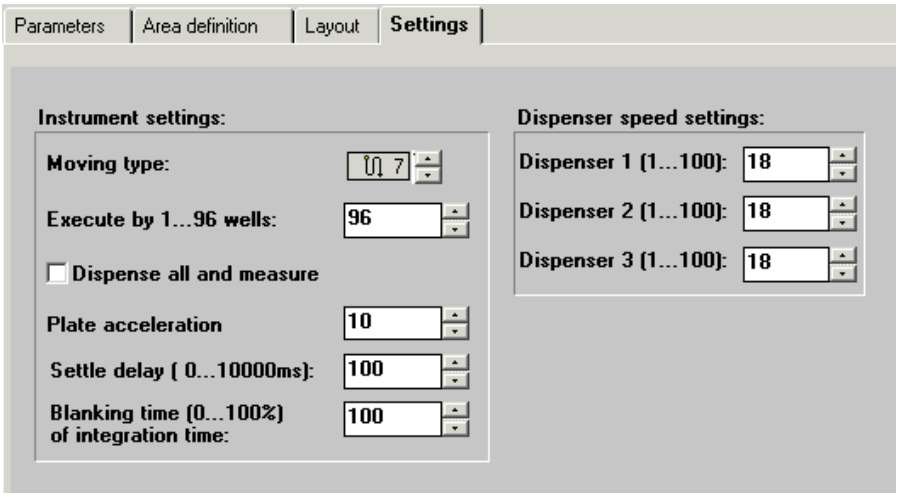


1.5.5.1.2 Layout

You can give a layout for the measurement steps. For more information, see **Layout** on p. 1-32 and in the **Procedure Desktop** part of the manual.


Parameters
Area definition
Layout
Settings
Type: BLANK
Name: Blank
Dilution
Assay: Assay1
Apply
Clear
Fill
Clear all
Cut
Copy
Paste
1 2 3 4 5 6 7 8 9 10 11 12
A BLANK Blank | CALIBR. Cal 4 1000.000
B BLANK Blank | CALIBR. Cal 4 1000.000
C CALIBR. Cal 1 1.000 | SAMPLE Un1 1:1
D CALIBR. Cal 1 1.000 | SAMPLE Un1 1:1
E CALIBR. Cal 2 10.000 | SAMPLE Un2 1:1
F CALIBR. Cal 2 10.000 | SAMPLE Un2 1:1
G CALIBR. Cal 3 100.000 | SAMPLE Un3 1:1
H CALIBR. Cal 3 100.000 | SAMPLE Un3 1:1

1.5.5.1.3 Settings



The instrument settings are:

- **Moving type.** The program searches for wells to dispense/measure in the order defined by this input field. If the Moving type has been selected as above, the columns may not actually be measured in opposite directions unless adjacent columns are selected.

  If a well has several measurement points defined, the points within the well are measured using the same Moving type as defined for the wells.

- **Execute by 1...n wells.** The Execute by 1...n wells setting defines the size of a group of wells. As many wells as defined by this field are dispensed/measured at a time. The default group size is the number of wells on the plate, which means that all the wells are dispensed/measured in one pass of the session steps. If the group size is less than the total number of wells on the plate, the steps of the session are repeatedly run until all the selected wells are dispensed/measured. Suppose that you have a 96-well plate and have selected all the wells. Setting Execute by 1...n wells to 8 means that the steps are repeated 12 times and 8 wells are measured at each pass.

- **Dispense all and measure** (not CF). If Dispense all and measure is selected, all the wells defined e.g. by **Execute by 1...96 wells** will be

dispensed and after that the defined wells will be measured. If **Dispense all and measure** is not ticked, the instrument dispenses and measures one well at a time before moving on to the next one.

- **Plate acceleration (1...10).** Defines the acceleration used for plate movements. Acceleration can be varied between setting 1 (0.05 m/s^2) and setting 10 (0.5 m/s^2). The highest acceleration can be used for small wells, such as on the 96-well plate. Lower accelerations are used for larger wells as default values. With high viscosity or solid samples, e.g. agar, higher than default acceleration speeds can be used. The acceleration setting also affects the maximum speed of the plate, the lower the acceleration, the lower the plate speed.
- **Settle delay (0…10000 ms).** Defines the time the instrument will wait at each well after a plate movement before it starts to measure.
- **Blanking time (0…100%) of integration time.** Defines the integration time of blanking. If the value is 0, blanking is not executed. If the value is between 1–100%, the blanking time is approximately calculated as: (integration time × value)/100. Round the result to the nearest 20 ms. The maximum blanking time is 10000 ms before and after the **Execute by 1…n wells** setting. Only used in luminometry (FL only).

The **Dispenser settings** options are (not CF):

With these settings you can adjust the speeds of the optional dispensers to gain optimal dispensing results. The default setting 18 is suitable for a viscosity equal to that of water. The dispenser speed setting defines the speed as % of the maximum possible speed with that dispenser.

- **Dispenser 1 (1...100).** Defines the dispensing speed of dispenser number 1.
- **Dispenser 2 (1...100).** Defines the dispensing speed of dispenser number 2.
- **Dispenser 3 (1...100).** Defines the dispensing speed of dispenser number 3.

1.5.5.1.4 RunStatus

RunStatus is the Status report of the last run of the session. The RunStatus tab appears after a run has been executed. The RunStatus report is generated both on the **Procedure Desktop** and **Results Desktop**. They are exactly identical except for the grid lines in the RunStatus report generated on the **Results Desktop**. The RunStatus report provides summary information on the session and comprises the session name, program version, instrument type and serial number, starting time of the run and the actual temperature. The RunStatus report also includes data about the steps. In addition, the RunStatus information reports the ending time of the run, number of warnings and errors and the actual temperature.

For more information, see **RunStatus** in both the **Procedure Desktop** and **Results Desktop** parts of the manual.

1.5.5.2 Measure step

The **Measure** step measures the given area well by well according to the step parameters.

The measurement method can be set in this step, the method can be either fluorometric or luminometric (FL only).

The **Measure** step contains the following measurement types with their own parameters:

- **Single**
- **Dual**
- **Kinetic**
- **Dual kinetic**
- **Scanning**
- **Monitor**

For more information, see Section **Steps|Measure** in the **Procedure Desktop** part of the manual.

1.5.5.3 Incubate step

The **Incubate** step sets the time and the temperature for the incubation in the instrument (for more information, see Section **Steps|Incubate** in the **Procedure Desktop** part of the manual).

1.5.5.4 Shake step

The **Shake** step shakes the plate using the given parameters. It is also possible to use shaking as a background task. Shaking is then on when the reader does not have other tasks to perform (for more information, see Section **Steps|Shake** in the **Procedure Desktop** part of the manual).

1.5.5.5 Dispense step (not CF)

Dispenses with the selected dispenser the defined volume against the wall of the well when possible (for more information, see Section **Steps|Dispense** in the **Procedure Desktop** part of the manual).

1.5.5.6 Dispense And Measure step (not CF)

This step is a combination of the **Dispense** and the **Measure** steps. Dispensing and measuring can be started at the same time. The parameters are the same as in the separate **Dispense** and **Measure** steps.

The step has a check box **Overwrite general step settings**, which breaks up the dispensing and measuring to work in loops. If the **Execute by 1...n wells** value is 1, the dispensing and measuring is carried out well by well through the selected area. If the value is over 1, e.g. 3, dispensing and measuring is carried out to the next 3 wells. The selected area is handled in groups of 3 wells (for more information, see Section **Steps|Measure** in the **Procedure Desktop** part of the manual).

The **Dispense all and measure** check box in **General** step **Settings** affects the Dispense And Measure step (see Section **General** step **Settings** on p. 1-26).

1.5.5.7 Pause step

The **Pause** step pauses the run, drives the plate out and gives an alarm, if desired (for more information, see Section **Steps|Pause** in the **Procedure Desktop** part of the manual).

1.5.5.8 Save/Load step

The **Save**/**Load** step can be used to save a **Results Desktop** sheet in a file (**Save**) or to load a sheet from a file to the **Results Desktop** (**Load**). Although they can be placed anywhere in the Steplist, they are not executed until the run has been completed (for more information, see Section **Steps|Save**/**Load** in the **Procedure Desktop** part of the manual).

1.5.5.9 Print step

To print sheets automatically the **Print** step can be used. Sheets are printed according to the current print area. The **Print** step is executed after all the other steps (for more information, see Section **Steps|Print** in the **Procedure Desktop** part of the manual).

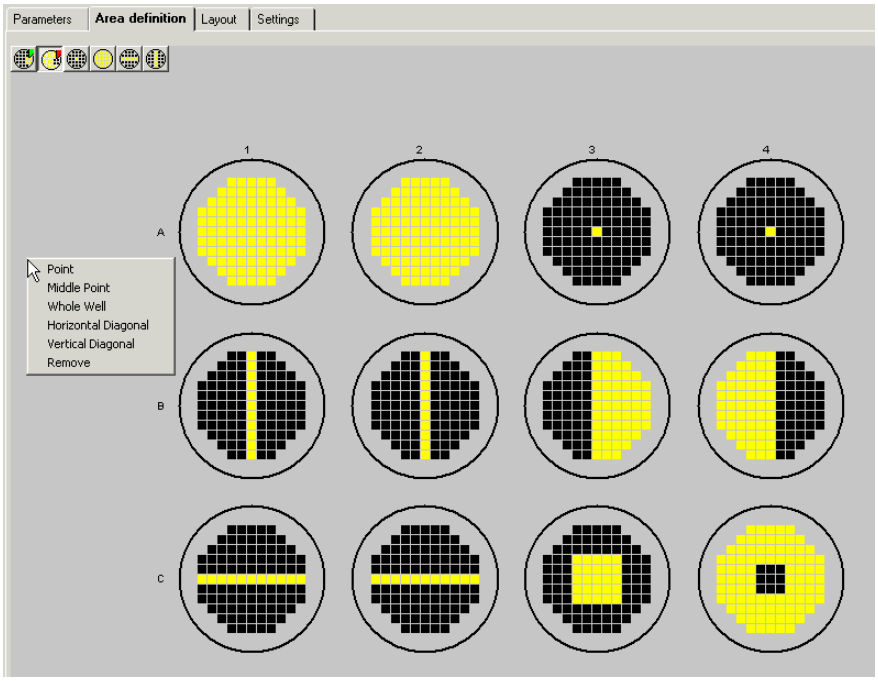
1.5.6 Area definition

The area definition is used to select the target areas for the **Measure** and **Dispense** steps. The floating menu appears by pressing the right mouse button in the **Area definition** window. The area is selected/deselected by painting the desired area from the points. Areas are selected from the points in the selected plate template. There is always one selectable point in the middle of each well. Selectable points inside the well are in a 1.5 mm grid.

The area definition contains tools to select and deselect :

- **individual points**
- **remove undesired points**
- **middle point of the wells**

- **all points in the well area**
- **horizontal** **or vertical** **diagonal of the wells**

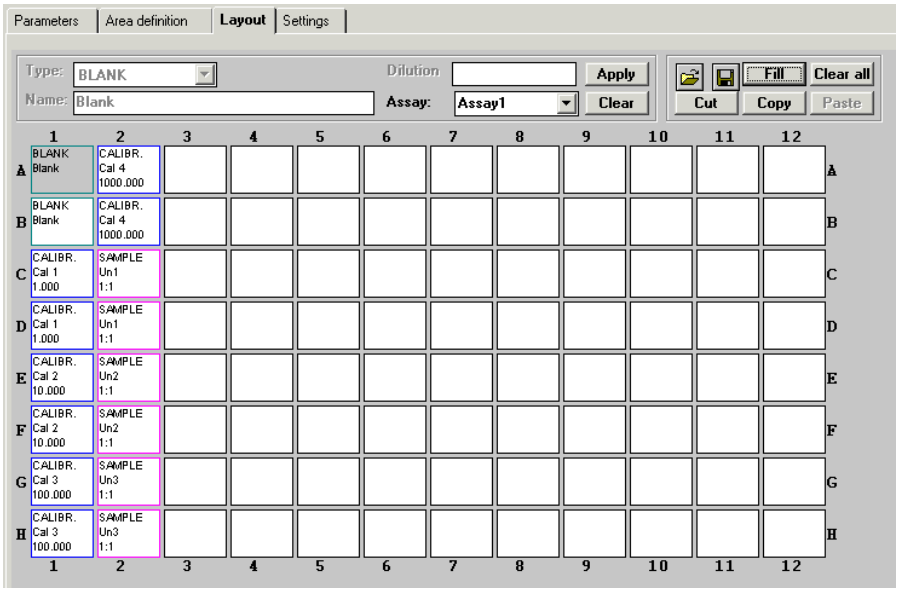


For more information, see **Area definition** in the **Procedure Desktop** part of the manual.

Note: To properly update the existing results sheets, the area definition and the plate layout should match. If there is a mismatch, you might get extra results.

1.5.7 Layout

The **Layout** function allows the user to specify the wells. The plate is displayed in the window.


Parameters
Area definition
Layout
Settings
Type: BLANK
Name: Blank
Dilution
Assay: Assay1
Apply
Clear
Fill
Clear all
Cut
Copy
Paste
1 2 3 4 5 6 7 8 9 10 11 12
A BLANK Blank | CALIBR. Cal 4 1000.000
B BLANK Blank | CALIBR. Cal 4 1000.000
C CALIBR. Cal 1 1.000 | SAMPLE Un1 1:1
D CALIBR. Cal 1 1.000 | SAMPLE Un1 1:1
E CALIBR. Cal 2 10.000 | SAMPLE Un2 1:1
F CALIBR. Cal 2 10.000 | SAMPLE Un2 1:1
G CALIBR. Cal 3 100.000 | SAMPLE Un3 1:1
H CALIBR. Cal 3 100.000 | SAMPLE Un3 1:1
1 2 3 4 5 6 7 8 9 10 11 12

The data fields are:

- **Type.** You can select the type of item from the drop-down list. This can be either CALIBR., CONTROL, SAMPLE or BLANK.

- **Name.** You can edit the name of the item.

- **Concentration/Dilution 1:** . The concentration of the calibrator or the dilution of the sample is displayed in this field. You can edit this data.

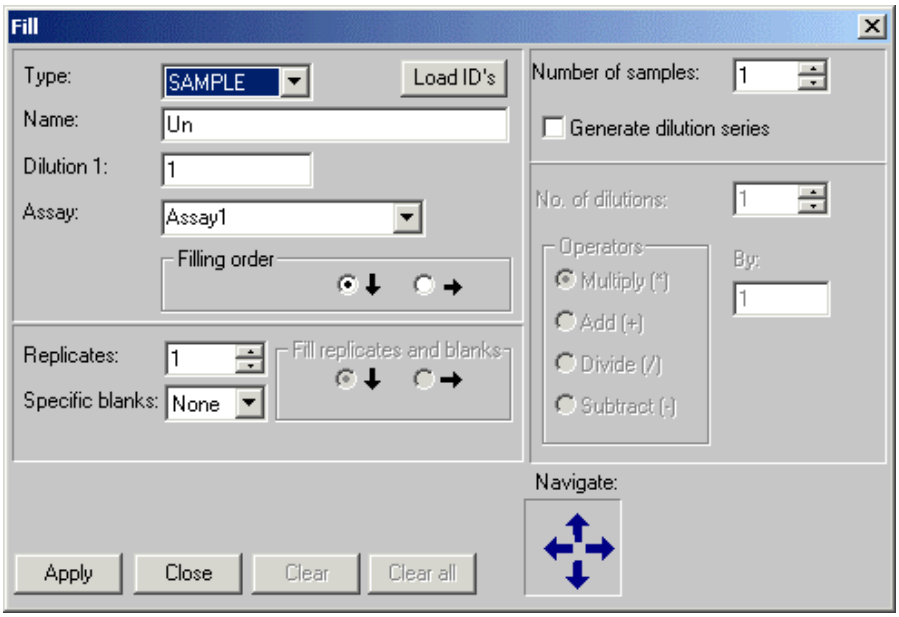
- **Assay.** The name of the assay is required when you have several assays on the same plate.

The operation buttons are:

- **Apply**. You can apply the well specification from the data fields to the selected well(s).
- **Clear**. Clears the well specification from the selected well(s).
- **Open**. You can load a layout file to the session.
- **Save As**. You can save the modified layout as a layout file.
- **Fill**. You can open the **Fill** dialog. Using the **Fill** dialog you can automatically specify as many wells as you want to, and the well name is automatically numbered to give each well unique names.
- **Clear all**. Clears the whole plate layout.
- **Cut**. Cuts the selected well specifications into the clipboard.
- **Copy**. Copies the selected well specifications into the clipboard.
- **Paste**. Pastes the well specifications from the clipboard.

You can open files with ***.pla** and ***.lay** extensions and save files with the ***.pla** extension.

1.5.7.1 Fill dialog



The data fields are:

- **Type.** You can select the type of item from the drop-down list. This can be either CALIBR., CONTROL, SAMPLE or BLANK.

- **Name.** You can edit the name of the item, and by using max. 50 characters in the beginning the software will automatically number the wells uniquely.

- **Load ID's.** Loads a list of sample IDs from a text file and uses these as sample names. (Only with SAMPLE type). The samples must be separated by a line feed in the text file, i.e. each sample on it's own line.

- **Concentration/Dilution 1:** . You can enter the concentration of the calibrator or the dilution of the sample.

- **Assay.** You can specify another assay by editing the field or selecting the assay from the drop-down list.

- **Filling order.** You can select the filling order of the item in the series.

- **Replicates.** You can enter the number of replicates of the item.

- **Specific blanks.** You can select the number of specific blanks.

- **Fill replicates and blanks.** You can select the filling order of the replicates and blanks.

- **Number of samples/controls.** You can key in the number of samples or controls when samples and controls are edited. The names of samples and controls are generated automatically by adding a running number to the name.

- **Generate concentration/dilution series.** You can tick this check box when you want to generate calibration or dilution series.

- **No. of calibrators/dilutions.** You can choose how many dilutions of each sample are made or how many calibrators are used.

- **Operators: Multiply (*), Divide (/), Add (+), Subtract (-).** You can select the operator used in the calculation of concentrations in calibration series and in the calculation of dilutions in sample dilution series.

- **By.** You can choose the value used in the calculation of concentrations in calibration series and in the calculation of dilutions in sample dilution series.

- **Navigate.** You can move on the microplate in different directions and select a desired well with the **Navigate** arrows.

The operation buttons are:

- **Apply.** Applies the data in the fields to the wells.

- **Close.** Closes the **Fill** box.

- **Clear.** Removes the data from the fields of the selected well and its replicates and specific blanks.

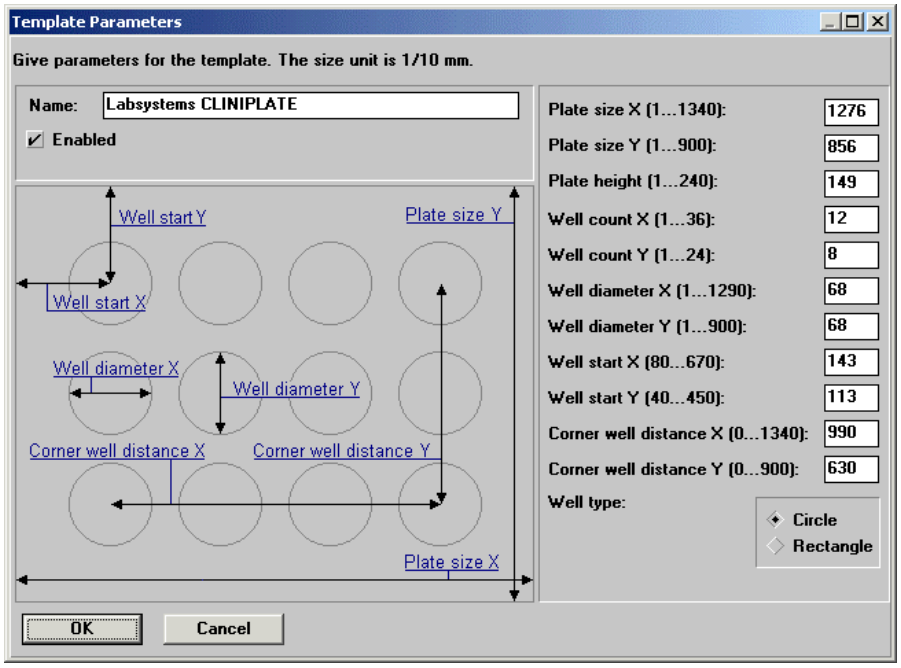
- **Clear all.** Removes the specification of all the wells on the plate.

For more information, see **Layout** in the **Procedure Desktop** part of the manual.

1.5.8 Template

The user can create and modify up to a 100 different plate templates – select **Setup → Plate templates → Modify**. The plate template list is configured by defining the default template and enabling/disabling templates.

The distance between measurement points in the well area is 1.5 mm and there is always one point located in the middle of the well area. The number of additional measurement points inside the well area depends on the well bottom area.



The following plate templates are defined in the template list:

- **Thermo Labsystems Microtiter 96 Plate**
- **Thermo Labsystems Microtiter 96 Strip Plate**
- **Thermo Labsystems Microtiter 384 Plate**
- **Thermo Labsystems Microtiter 384 Plate w. adapter**
- **Thermo Labsystems Microlite 96 Plate**
- **Thermo Labsystems CLINIPLATE**
- **Thermo Labsystems COMBIPLATE (in Multiframe)**
- **Thermo Labsystems CLINIPLATE 384**
- **Thermo Labsystems CLINIPLATE 384 with adapter**
- **Dynex 96-well Microlite plates**
- **96-Wells GENERIC**
- **96-Wells CORNING 25860**

- **96-Wells COSTAR 3596**
- **96-Wells NUNC N-167008**
- **96-Wells FALCON 3072**
- **96-Wells FALCON 3075**
- **96-Wells GREINER 655180**
- **96-Wells IWAKI 3860-096**
- **384-Wells GENETIX**
- **384-Wells GENETIX with adapter**
- **384-Wells NUNC N-242757, N-242765**
- **384-Wells GREINER**
- **384-Wells COSTAR 3702**
- **48-Wells CORNING 25830**
- **48-Wells COSTAR 3548**
- **48-Wells NUNC 150687**
- **48-Wells SUMILON 80480**
- **48-Wells IWAKI 3830-048**
- **24-Wells CORNING 25820**
- **24-Wells COSTAR 3524**
- **24-Wells GREINER 662160**
- **24-Wells FALCON 3047**
- **24-Wells NUNC Multidish N-143982**
- **24-Wells SUMILON 80240**
- **24-Wells IWAKI 3820-024**
- **12-Wells CORNING 25815**
- **12-Wells COSTAR 3512**
- **12-Wells NUNC 150628**
- **12-Wells SUMILON 80120**

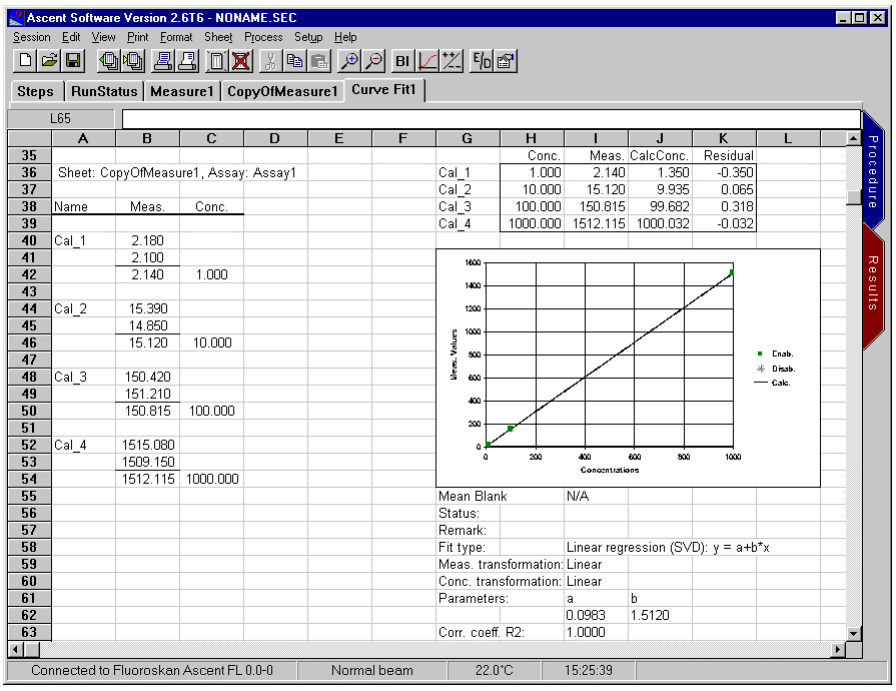
- **12-Wells IWAKI 3815-012**
- **6-Wells CORNING 25810**
- **6-Wells COSTAR 3516**
- **6-Wells NUNC Multidish N-152795**
- **6-Wells FALCON 3046**
- **6-Wells GREINER 657160**
- **6-Wells IWAKI 3810-006**
- **Full area**
- **Petri dish FALCON with adapter**
- **Petri dish COSTAR with adapter**
- **Petri dish GREINER with adapter**
- **2 x Petri dish COSTAR with adapter**
- **6 x Petri dish CORNING with adapter**
- **60-Well Terasaki with adapter**
- **72-Well Terasaki with adapter**
- **864 Generic**
- **PCR tubes/plate with adapter**

The templates are saved in the **TEMPLATE.CNF** file in the work directory.

1.5.9 Results Desktop

The **Results Desktop** module is a spreadsheet type calculator and a grid environment, which is used when basic calculations, graphic views and reports to the printer, screen, file or to other programs (Clipboard) are created. It is easy to create new spreadsheets and select them only by clicking the tabview. The tabview bar allows the user to scroll the tabviews by using the scroll buttons.

Some sheets are generated automatically, such as **Steps**, **RunStatus** and **Measure** sheets. The **Steps** sheet describes parameters that were used in each procedure step. The **RunStatus** sheet provides summary information on the session, such as starting and ending times, and possible problems during the measurement etc. The **"Measure"** sheet name follows the given name of the **Measure** step, so the sheet name can be something else than **"Measure"**. This sheet contains measured raw data values without any modifications.



1.6 Printing

You can print selected worksheets or sheet areas (for example, **Steps**, **Measure**, **RunStatus** and **Curve Fit** sheets) by defining the ranges, print formats and other print options. Print commands can be found in both the **Session** menu and the **Print** menu when **Results Desktop** is selected.

1.7 Using tools

The main tools of the program:

- The **Procedure Desktop** for assay setup and instrument control.

  Using the advanced graphical interface, the assay procedure steps are simply dragged from the toolbox and dropped into the desktop Steplist. Every step has its own parameters. Wells to be measured can be selected in a completely visual format. Any combination of wells can be measured.

- The **Results Desktop** for data reduction and results calculation.

  When an assay is defined, the calculations and the reports are configured in a unique spreadsheet environment. The assay may consist of several worksheets, which are open simultaneously and allow easy cross-referencing of data from one sheet to another. Along with the basic spreadsheet functions, a number of other calculation methods, including curve fittings, qualitative cut-offs and statistical functions, are also available.

- The **Template Editor** to create templates.

  The advanced multiwell capability allows the instrument to read a wide range of plate formats. A template database covers the most common 1- to 384-well plates. When needed, it can also be programmed to read nonstandard plate formats. Special sample vessels (e.g. Petri dishes and Terasaki plates) can also be measured using suitable adapters provided by Thermo Labsystems.

1.8 Making applications

You can create your own session or modify ready-made example sessions, which are supplied with the program.

1.8.1 Creating your own Session

You can make a new application by creating a new Session. The session is based on a plate template. The program is supplied with a template database covering the most common plates. You can always create your own templates using the Template Editor (**Plate Templates**).

1.8.1.1 Selecting the Template

Select **New** from the **Session** menu and choose a plate template from the template list.

1.8.1.2 General step

The **General** step covers the general parameters, the area definition and the plate layout. The **Parameters** tabview is active and you can type your name in the **User name** text box and comments in the **Comment** remark box.

1.8.1.3 Selecting the measurement area

By selecting the **Area definition** tabview you will see the template layout and you can define wells to be measured. Black dots indicate possible measurement points. You can select the **Area definition** tool from the tabview and mark the measurement wells by painting the area. The selected wells will turn yellow. You can change the selection as many times as you wish. With the **Remove** tool you can erase undesired points.

1.8.1.4 Defining the plate layout

By selecting the **Layout** tabview you will see the plate layout. You can specify the well definition. You can use either the fields in the **Layout** window or the **Fill** dialog.

1.8.1.5 Selecting Steps to the Procedure

The **General** step is always the first step in the Steplist. Select the other steps to the Steplist from the Procedure Tool Bar or from the **Steps** menu. You can change the step order in the Steplist by dragging the step button and dropping it into another place. Any step (except the **General** step) can be removed by dragging it into the **Remove** box.

Every measurement step generates worksheets to the **Results Desktop** module. Worksheets are named according to the corresponding **Step name**. The naming convention requires a different name for each measurement step (i.e. if not given 1, 2...). A unique name is created automatically with the step and when editing this field, you need to keep the names unique.

1.8.1.6 Defining parameters to Steps

Every step has a default name and a group of default parameters. The default **Step name** and parameter values can be changed. To define the specific area and layout you have to click the **Overwrite general step settings** check box.

1.8.1.7 Processing results and reports

You can define calculations and reports in the **Results Desktop** module. Calculations comprise data handling and processing of results. Various reports can be generated on the **Results Desktop**. There you can create, save and load worksheets, which are filed together with other session information.

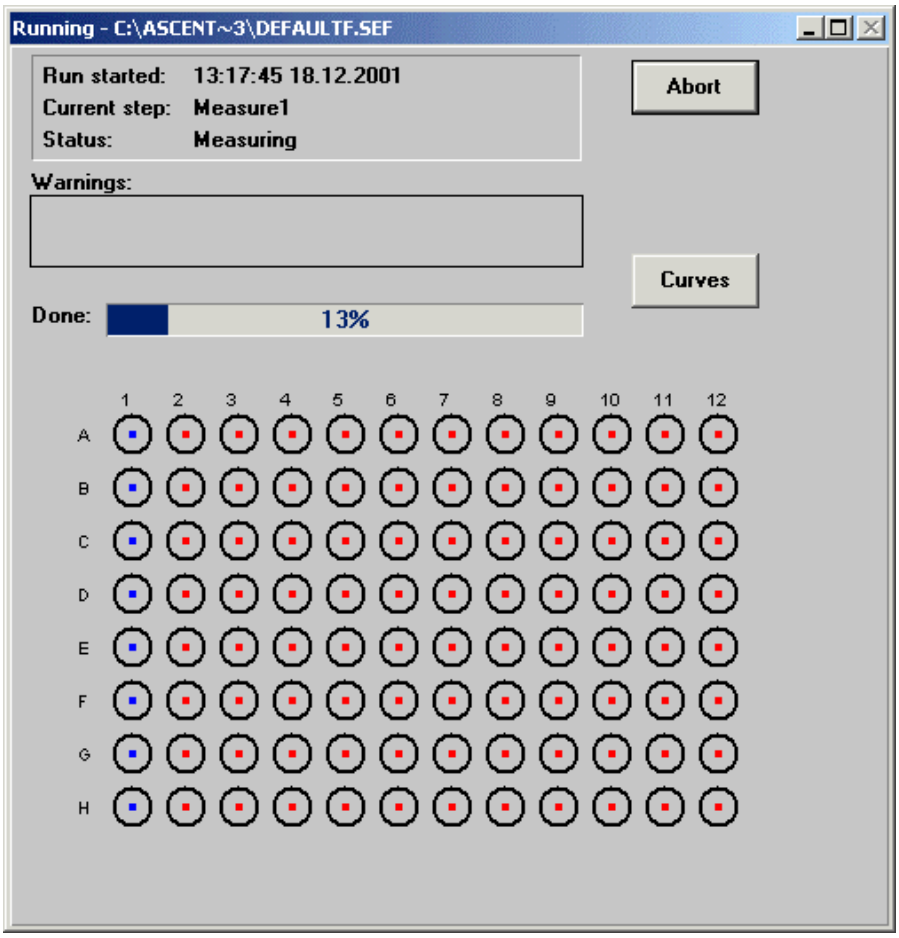
Each measurement step creates one sheet for the measured raw data to the **Results Desktop**. The sheets are named automatically according to the corresponding measurement step. The name of the raw results sheet is the same as the name of the measurement step (e.g. **"Measure"**).

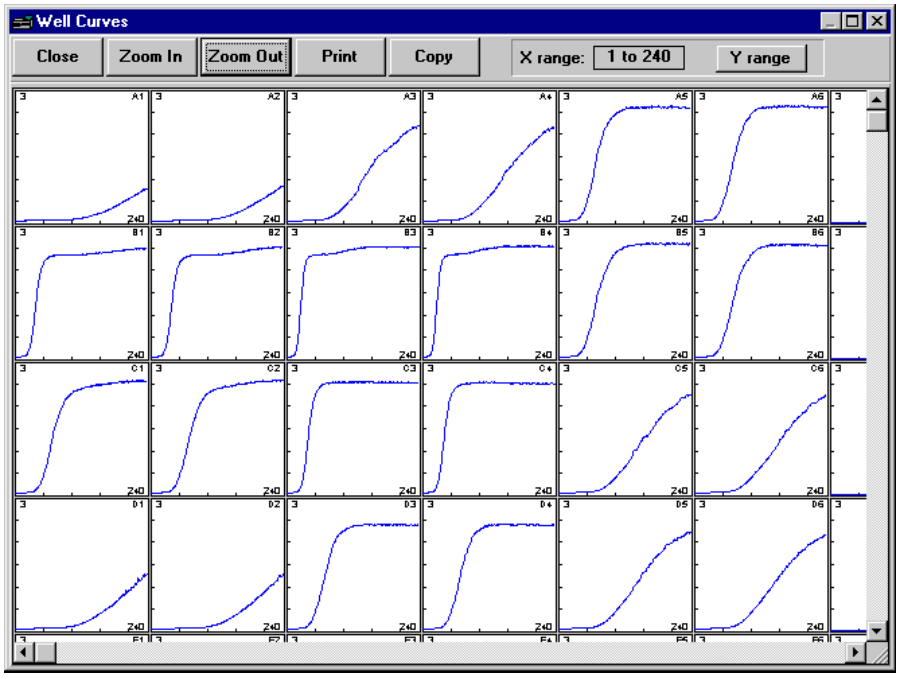
The reports to the printer are created in the spreadsheet environment. The user can, for example, define the printout header, page numbering, fonts and the borders. Reports are created in the same way as in a general worksheet environment.

1.8.1.8 Executing the Session

You can run the **Session** by clicking the **Start** tool button or by selecting the **Procedure** command from the **Execute** menu. During the procedure the **Running** window displays the step execution. All created sheets are updated from run to run.

Example 1: Running a kinetic **Measure** step





- **Curves**. Shows the curves during the measurement. The kinetic curves of all the measurement steps of a session can be monitored in the same window. If the session has more than one kinetic step, the steps to monitor can be selected from a list box. The minimum and maximum Y range values of the curves can be set manually. Another possibility is to let the program automatically set the maximum.

Note: If you select **Options → Automatic runtime Curves**, the curves will be displayed automatically.

Note: If you have a kinetic measurement of a multipoint well, then the running or online curve displayed is the kinetic curve of the middle point.

The curves can be printed using the **Print** button. The curves can also be copied to the Clipboard using the **Copy** button.

Note: You must print or copy the curves to the Clipboard if you want to save them *manually*. They will disappear when the measurement step is completed and the **Well Curves** window is closed. Note that what is seen on the screen is saved to the Clipboard, so adjust the picture accordingly.

It is also possible to save the runtime curves *automatically*. If the **Create Kinetic Curves-sheet** in the **Measure** step is chosen, the curves will automatically be copied and pasted into a new sheet on the **Results Desktop**.

1.8.2 Executing loops of steps

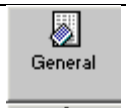
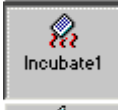
The execution order of the Steplist can be modified. Steps may be executed in several loops (**General Step → Settings → Execute by**…). Certain steps are identified as "end loop" steps. These steps are:

- Steps with **Overwrite general step settings** checked.
- An incubate step with an **Incubation time** of zero.
- End of the Steplist.

The following rules apply when a session is executed:

- The execution of a session starts from the step following the **General** step until a loop is started. Several steps, such as **Dispense** and **Measure**, can belong to a loop. The execution of the loop continues until an "end loop" step is encountered. The execution returns to the first step of the loop without running the "end loop" step.
- Not until all the points/wells are dispensed and/or measured, is the "end loop" step executed. This sequence is repeated until all the steps of the session are executed.
- The "end loop" step breaks the loop and a new step with its own area, method and settings parameters can be added.
- Sheet **Save** steps are not executed until all the other steps of the session have been completed.

The example below performs an assay where two pairs of dispensing and measurement have been looped into two separate loops.

General Step		Execute by setting =1
Loop 1	 	Repeats steps Dispense1 and Measure1 for all wells selected in the Area definition (Dispense A1, Measure A1, Dispense B1, Measure B1 etc.)
End Loop Step		Incubate step with zero time to end the first loop
Loop 2	 	Repeats steps Dispense2 and Measure2 for all wells selected in the Area definition (Dispense A1, Measure A1, Dispense B1, Measure B1 etc.)

1.8.3 Modifying an existing session

You can modify an existing session in the same way as you created it. You can open an existing session by selecting the **Open** session command from the **Session** menu.

1.8.4 Example applications

Some applications are supplied with the program and they are ready-for-use after some minor changes. Note that these sessions are only meant to be read. If these are used in your own applications, you must save them with your own session name for later use.

1.8.5 Running an application from the example applications

The steps for running an application from the example applications:

- Open the session.
- Make the changes according to your application.
- Save the session with a new name.

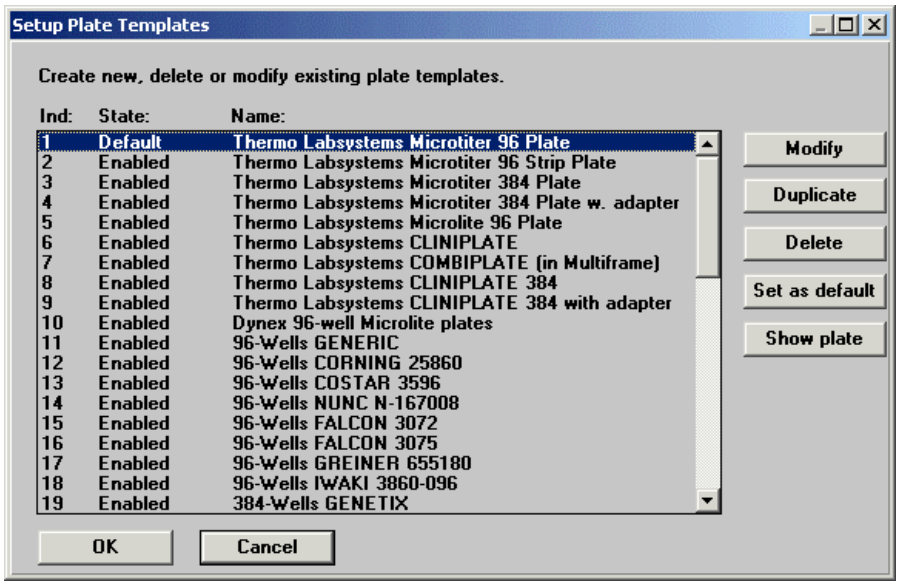
Now you have a session of your own to run and modify, when needed.

Note: You cannot change the defined plate template.

Note: Example files marked with a “d” are demo applications that cannot be run, for example: **exampled.lay**. Example files without the letter “d” in the end can be used with the instrument, for example: **example.lay**.

1.9 Template Editor

The Template Editor in the **Setup** menu allows the user to create and modify plate templates.


Setup Plate Templates
Create new, delete or modify existing plate templates.
Ind: State: Name:
1 Default Thermo Labsystems Microtiter 96 Plate
2 Enabled Thermo Labsystems Microtiter 96 Strip Plate
3 Enabled Thermo Labsystems Microtiter 384 Plate
4 Enabled Thermo Labsystems Microtiter 384 Plate w. adapter
5 Enabled Thermo Labsystems Microlite 96 Plate
6 Enabled Thermo Labsystems CLINIPLATE
7 Enabled Thermo Labsystems COMBIPLATE (in Multiframe)
8 Enabled Thermo Labsystems CLINIPLATE 384
9 Enabled Thermo Labsystems CLINIPLATE 384 with adapter
10 Enabled Dynex 96-well Microlite plates
11 Enabled 96-Wells GENERIC
12 Enabled 96-Wells CORNING 25860
13 Enabled 96-Wells COSTAR 3596
14 Enabled 96-Wells NUNC N-167008
15 Enabled 96-Wells FALCON 3072
16 Enabled 96-Wells FALCON 3075
17 Enabled 96-Wells GREINER 655180
18 Enabled 96-Wells IWAKI 3860-096
19 Enabled 384-Wells GENETIX
Modify
Duplicate
Delete
Set as default
Show plate
OK
Cancel

When **Plate Templates** is selected, the list box shown contains all the plate templates found in the **TEMPLATE.CNF** file. New plate templates or modifications in the list are saved in the **TEMPLATE.CNF** file when the dialog is closed using the **OK** button. If the dialog is closed using the **Cancel** button, no changes are saved.

In the list box, items marked with *Enabled* are enabled, those marked with *Disabled* are disabled and the one that is marked with *Default* is the default definition.

The operation buttons are:

- **Modify**. You can start to modify the selected template.
- **Duplicate**. Makes a copy of a currently selected template. The user can modify the copy and save it with a new name.
- **Delete**. Deletes the currently selected template.

- **Set as default**. Sets the currently selected template as the default template, which is offered first to the user when a new session is created.
- **Show plate**. Shows the plate layout of the currently selected template.

When you press the **Modify** template button, the **Template Parameters** dialog appears. This dialog is used when the parameters of the plate definition are modified.

Note: Modifications in a plate template valid only from **Session → New**...

1.10 Managing files

1.10.1 Opening and saving Sessions

This module allows the user to load an old session from the disk according to the filename and to save the session using the old or a new name. If you want to use your application in any other environment, note that one session consists of four files: ***.sef** (Fluoroskan Ascent and Fluoroskan Ascent CF) or ***.sec** (Fluoroskan Ascent FL), ***.vtg**, ***.vtb**, and ***.lay**.

Refer to chapter **File types used in Ascent Software** in the **Reference** part of the manual.

Note: If you start a program without the command line argument (session name), the default session name is "**DEFAULT.SEF**" (for Fluoroskan Ascent and Fluoroskan Ascent CF) /"**DEFAULT.SEC**" (for Fluoroskan Ascent FL). When you create a new session, the default name (session name) is "**NONAME.SEF**" (for Fluoroskan Ascent and Fluoroskan Ascent CF)/"**NONAME.SEC**" (for Fluoroskan Ascent FL) until you save it with a new name.

1.10.2 File structures

All the initial and setup information is in ASCII format. The end characters of the fields are CR and LF, and they are included in the field sizes.

1.10.3 Importing and exporting

Connections to other programs are done via the Clipboard. All the worksheets can be saved and read in the ASCII text or Excel 4.0 format.

1.10.4 Backup

Backup is recommended in order to avoid data loss in case of hard drive crash or if a computer virus attacks your system. The most important files are your work files ***.sef** (Fluoroskan Ascent and Fluoroskan Ascent CF)/***.sec** (Fluoroskan Ascent FL), ***.vtg**, ***.vtb**, ***.lay**, and ***.pla**.

Note: If you want to make a backup copy of a session, make sure you save all four session-specific files: ***.sef**/***.sec**, ***.vtg**, ***.vtb**, and ***.lay**.

2 Procedure Desktop

2.1 Menus (procedure)

2.1.1 General

Commands are grouped in menus. Some commands carry out an action immediately, others display a dialog box where you can select options.

You can quickly choose the most commonly used commands by using the mouse to click the button on the tool bar.

Menu layout

Session	**View**	**Execute**	**Steps**
New...	Desktop Bar	Procedure	Measure
Open...	Status Bar	Plate In	Incubate
Save	Tool Bar	Plate Out	Shake
Save As...	Tabs Bar On Top	Prime	Dispense
Print...	Procedure	Empty	Dispense And Measure
Exit	Results		Pause
			Save/Load
			Print
			Remove
			Inactivate
			Activate
			Print Current Step
			Print All Steps

Setup	**Options**	**Help**
Plate Templates		Help Contents
Filters		About
Password		
Dispensers		
Colors		
Printout		
Instrument Status		

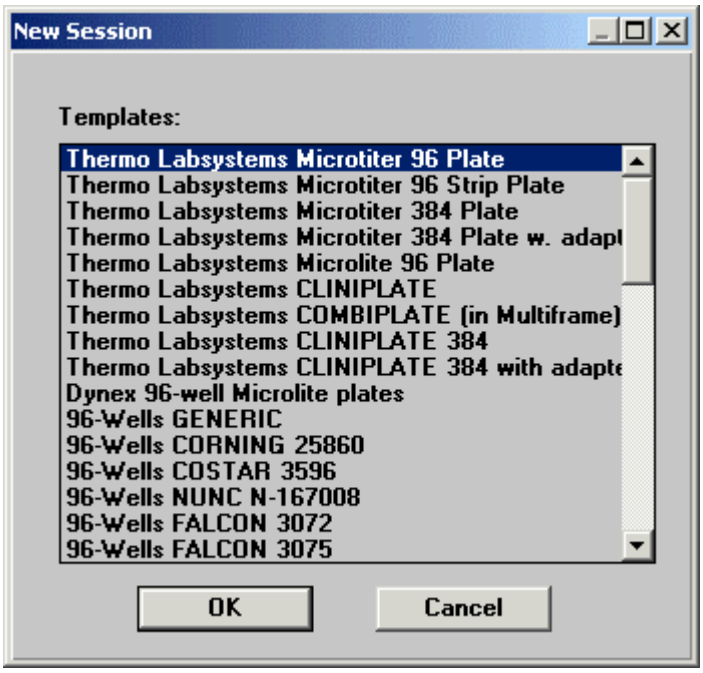
The menu commands are described in the following chapters.

2.1.2 Session

2.1.2.1 New...

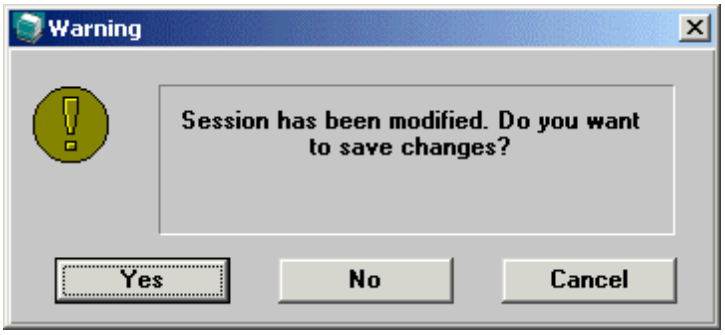
New... (Session menu) or

You can create a new session with the New command. The program proposes a default name for the session, **"NONAME.SEF"** (Fluoroskan Ascent and Fluoroskan Ascent CF)/**"NONAME.SEC"** (Fluoroskan Ascent FL).



The dialog list box contains all the plate template definitions found in the **TEMPLATE.CNF** file.

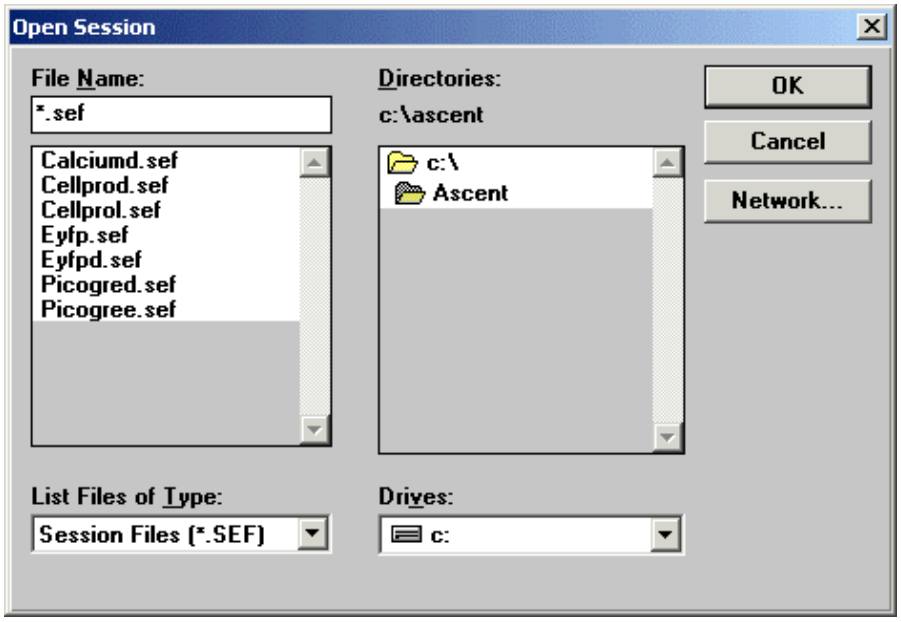
If the current session has been modified and has not been saved, an option to save the changes is given:



2.1.2.2 Open...

Open... (Session menu) or

Use this command to open an existing Session. You can only have one session open at a time. Change to another session by opening that session.



In an **Open Session** dialog box, you can:

- type a full filename in the **File Name** box.
- display selected files in the **File Name** box by selecting a type from the **List Files of Type** drop-down list box. You can also choose files by typing a partial filename with * or ? wildcards in the **File Name** box and pressing Enter.
- view the contents of different directories by selecting a directory from the **Directories** list box. You can also change directories by typing a directory in the **File Name** box and pressing Enter.
- view the contents of different drives by selecting one from the **Drives** drop-down list box.
- connect to a network drive by selecting **Network...** .

Parameters:

- **File Name.** The box lets you enter the name of the file to open, or a file specification to limit the files which are displayed in the list box. The list box displays the filenames in the current directory that match the file specifications in the box.

- **List Files of Type**. Lets you select the file types you want displayed. With regard to sessions, the fixed file extension is always ***.sef** for the Fluoroskan Ascent and Fluoroskan Ascent CF, and ***.sec** for the Fluoroskan Ascent FL. The Fluoroskan Ascent FL can also read ***.sef** and ***.sel** (Luminoskan Ascent luminometric file) files in addition to ***.sec** files.
- **Directories**. Select the directory in which the program stores the Session you want to open.
- **Drives**. Select the drive in which the program stores the Session you want to open.
- **Network**... . Displays a dialog box with available network servers so you can connect to a different server when your system is running on the supported network.

2.1.2.3 Save

Save (Session menu) or

Use this command to save the current Session and its name and location. With regard to sessions, the file extension is always ***.sef** for the Fluoroskan Ascent and Fluoroskan Ascent CF, and ***.sec** for the Fluoroskan Ascent FL.

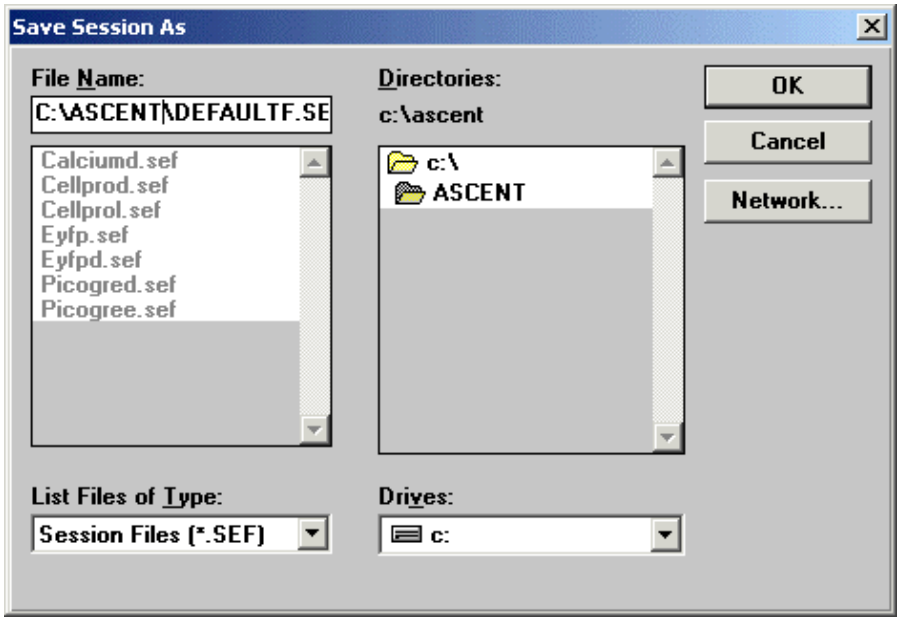
If you want to change the name or location of an existing Session before you save it, choose the **Save As** command.

2.1.2.4 Save As...

Save As... (Session menu)

Use this command to save the current Session with a new name.

Note: To save a Session with its existing name and location, use the **Save** command.



- **File Name.** Type a new filename to save a Session with a different name. Use the current name or select a name from the list to save a Session with an existing filename.

Note

- DO NOT use any file or directory names more than eight characters long. Ascent Software does not support long file or directory names.
- DO NOT use any nonstandard characters in Ascent Software.
- DO NOT use a dot character in the directory name. The dot character is reserved for the extension.

Note: A filename can contain up to eight characters and an extension of up to three characters. The program adds the extension you specify in the *List Files of Type* drop-down list box.

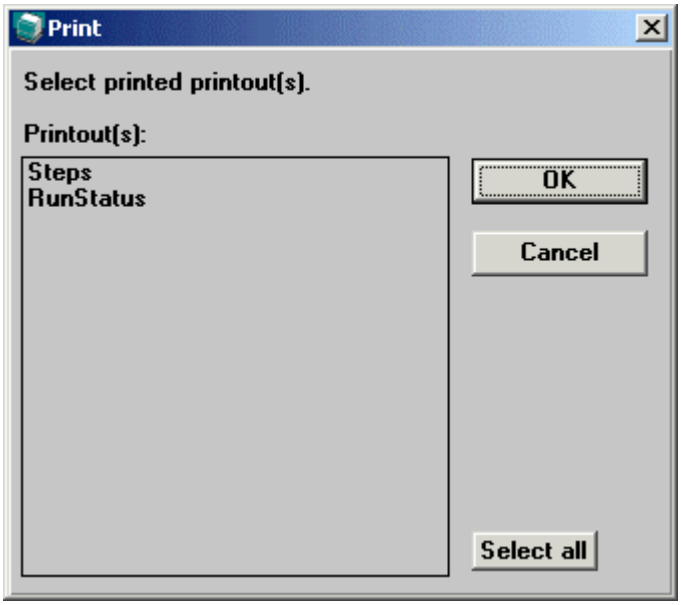
- **List Files of Type.** Lets you select the file types you want displayed. With regard to Sessions, files can be saved only with the fixed ***.sef** (Fluoroskan Ascent and Fluoroskan Ascent CF) or ***.sec** (Fluoroskan Ascent FL) extension.

- **Directories.** Select the directory in which you want to store the Session.
- **Drives.** Select the drive in which you want to store the Session.
- **Network...** . Displays a dialog box of available network servers so you can connect to a different server when your system is running on the supported network.

2.1.2.5 Print...

Print... (Session menu)

The Print command displays the **Print** dialog box where you can select printout(s) to print.



2.1.2.6 Recently used file list

The Session menu Recently used file list includes the names of five recent protocols for fast access.

2.1.2.7 Exit

Exit (Session menu)

Use this command to exit the program. You can also use the **Close** command in the **Control** menu of the program.

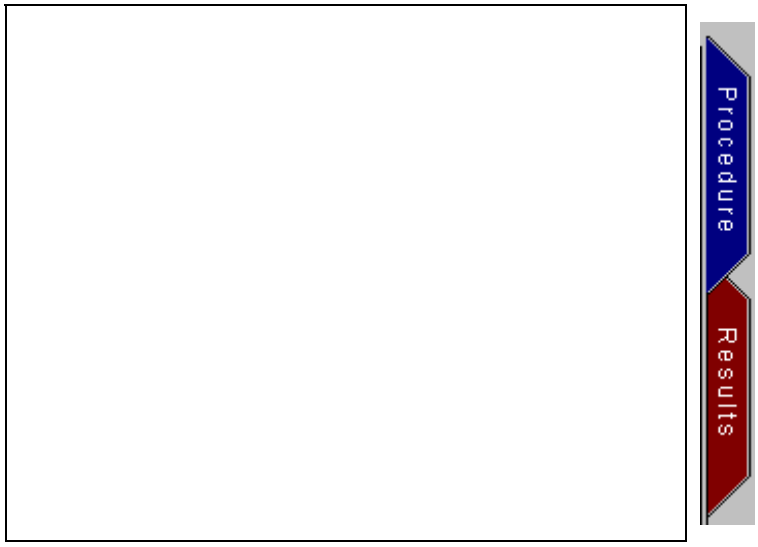
If changes have been made, the program prompts you to save the Session before exiting.

2.1.3 View

2.1.3.1 Desktop Bar

Desktop Bar (View menu)

The Desktop tabviews are located to the right of the active desktop. The Desktop tabview selects the active desktop for the program. When the desktop is changed, the menus and tool bars also change.



Use this command to view the Desktop Bar.

2.1.3.2 Status Bar

Status Bar (View menu)

When a command is selected, the left side of the status bar briefly describes the command. Normally the status bar shows the line state of the instrument, the beam size, the actual temperature and the current time.

Instrument status bar:

Note: The status bar at the bottom of the screen also displays information about a selected command.

Message status bar:

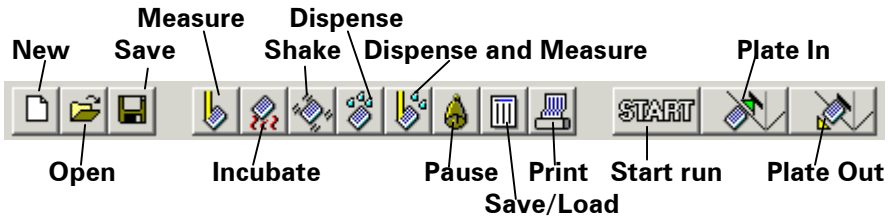
Use the **Status Bar** command in the **View** menu to display or hide the status bar.

2.1.3.3 Tool Bar

Tool Bar (View menu)

Along the top of the Desktop window, you can see a horizontal strip containing several tools - this is the tool bar. It offers the most commonly used functions in the menu as tool buttons. Although these buttons perform the same functions as their menu counterparts, they are more convenient to use.

Procedure tool bar:



Use the **Tool Bar** command in the **View** menu to display or hide the tool bar.

2.1.3.4 Tabs Bar

Tabs Bar On Top (View menu)

Use this command to display the Tabs Bar either on top of the view or in the bottom of the view.

2.1.3.5 Procedure

Procedure (View menu)

Use this command to view the **Procedure Desktop**.

2.1.3.6 Results

Results (View menu)

Use this command to view the **Results Desktop**.

2.1.4 Execute

2.1.4.1 Procedure

Procedure (Execute menu) or

Use this command to run the Session.

2.1.4.2 Plate In

Plate In (Execute menu) or

Use this command to drive the plate into the instrument.

2.1.4.3 Plate Out

Plate Out (Execute menu) or

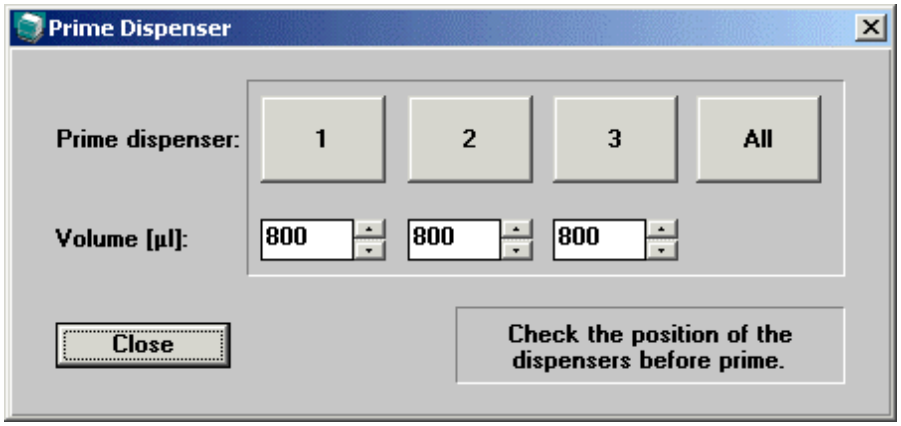
Use this command to drive the plate out of the instrument.

2.1.4.4 Prime (not CF)

Prime (Execute menu)

Use this command to prime the dispensers.

Note: Before priming the plate is retracted. If the dispensers are in the X, Y or M positions, priming will be done straight to the center of the plate. If priming to the plate is not desired, the tips should be moved into the container(s) or a suitable waste vessel.



- **Prime dispenser.** Primes the selected dispenser (1, 2, 3 or All). Only the buttons of the installed dispensers are enabled. When the **All** button is pressed, the priming command of every dispenser in use is sent to the instrument one after another.
- **Volume (µl).** Volume 100...9900 µl, in steps of 100 µl increments.

When the **Close** button is pressed, no priming commands are sent.

2.1.4.5 Empty (not CF)

Empty (Execute menu)

Use this command to empty the dispenser.

- **Empty dispenser**. Empties the selected dispenser. Only the buttons of the installed dispensers are enabled.

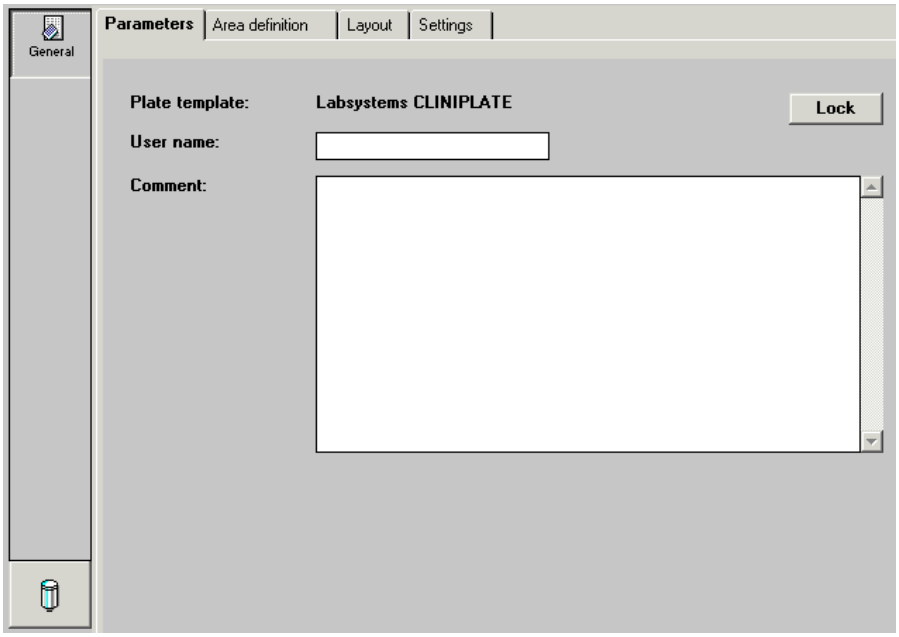
- **All**. Empties all dispensers.

2.1.5 Steps

The selections of the **Area definition**, **Layout** and **Settings** tabviews apply as default throughout all selected steps unless the steps have them defined with the **Overwrite general step settings** check box.

2.1.5.1 General

The General step is the first step of every session. The user cannot add or remove the General step. There is no shortcut button for the General step.



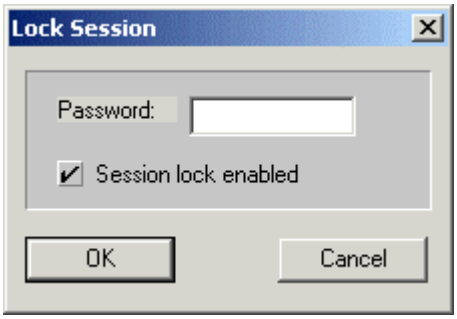
The following parameters for the General step are:

- **Plate template.** The name of the selected microplate, e.g. Labsystems Cliniplate.
- **User name.** The user name is given by the user.
- **Comment.** Further details or specifications about the session given by the user.
- **Lock.** A session-specific password can be added.

2.1.5.1.1 Session lock

To add a session-specific password:

1. Click the **Lock** button in the **General → Parameters** tab.



2. Make sure that the **Session lock enabled** checkbox is ticked.

3. Enter a password. Click **OK**, then retype password and click **OK** again. The session is now locked – the **Lock** button has now changed to **Unlock**.

Note: The password remains even if the session is saved under a different name.

To unlock the session for editing:

1. Click **Unlock**.

2. Type the password and click **OK**. You may now edit the session.

Note: DO NOT untick the **Session lock enabled** checkbox. If yo do, then the session lock is removed.

To remove lock:

1. Click **Unlock**.

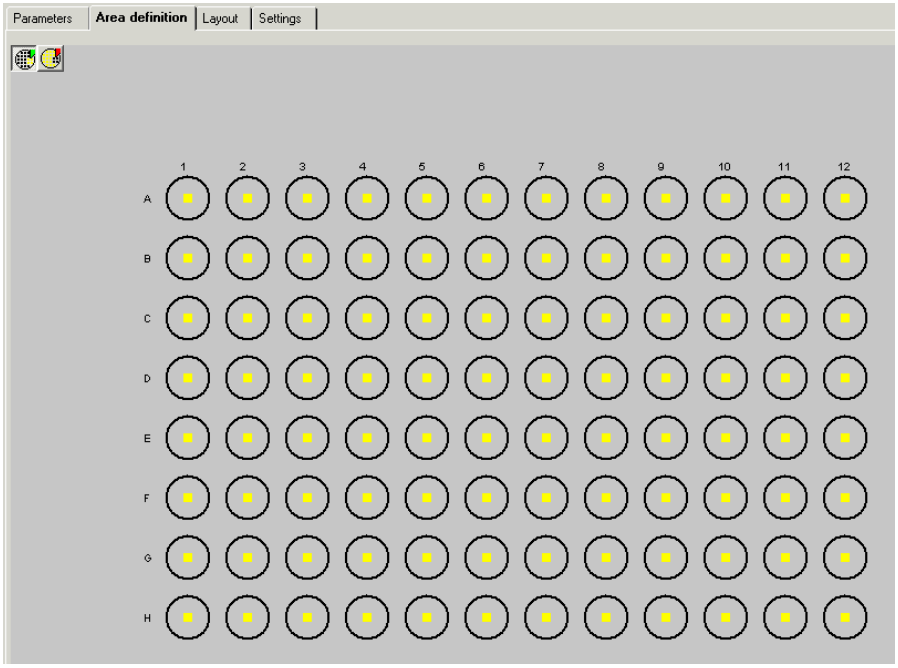
2. Type the session password AND untick the **Session lock enabled** checkbox.

3. Click **OK**, the lock has now been removed.

2.1.5.2 Area definition

The Area functions allow the user to **Point** (select) or **Remove** (deselect) areas to be measured. The area is a collection of measurement points on the plate. The maximum number of points in the X direction is 75 and in the Y direction 49. The minimum distance between two single measurement points is 1.5 mm.

The floating menu appears by pressing the right mouse button in the **Area definition** window. The command buttons are situated top left of the **Area definition** window.



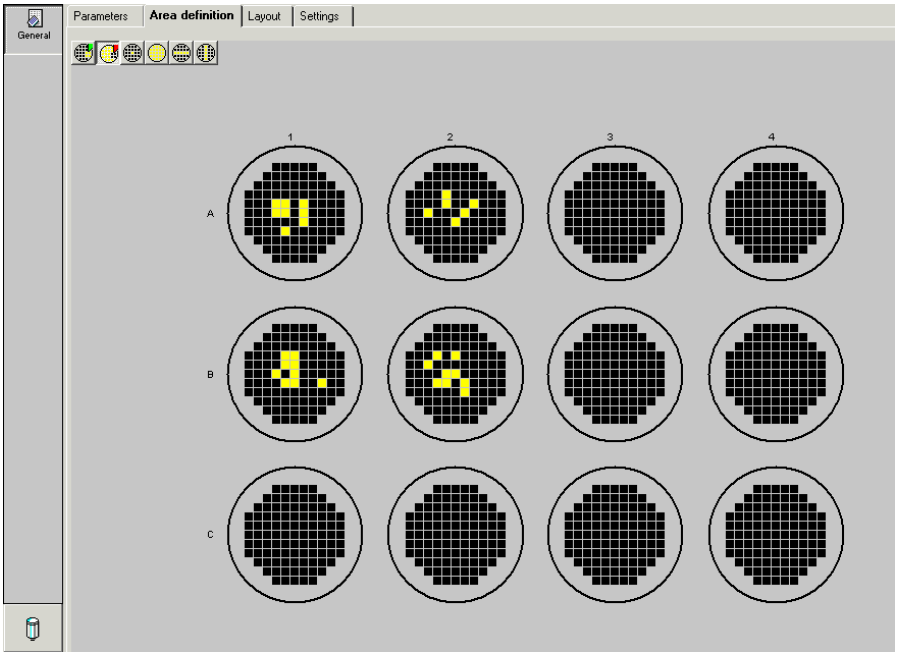
After defining the tool, select the area by painting the desired area. Wells are added to or removed from the measurement area depending on the tool. The points marked yellow are selected, black ones are not.

Note: To properly update the existing results sheets, the area definition and the plate layout should match. If there is a mismatch, you might get extra results.

2.1.5.2.1 Point

Point (Area menu) or

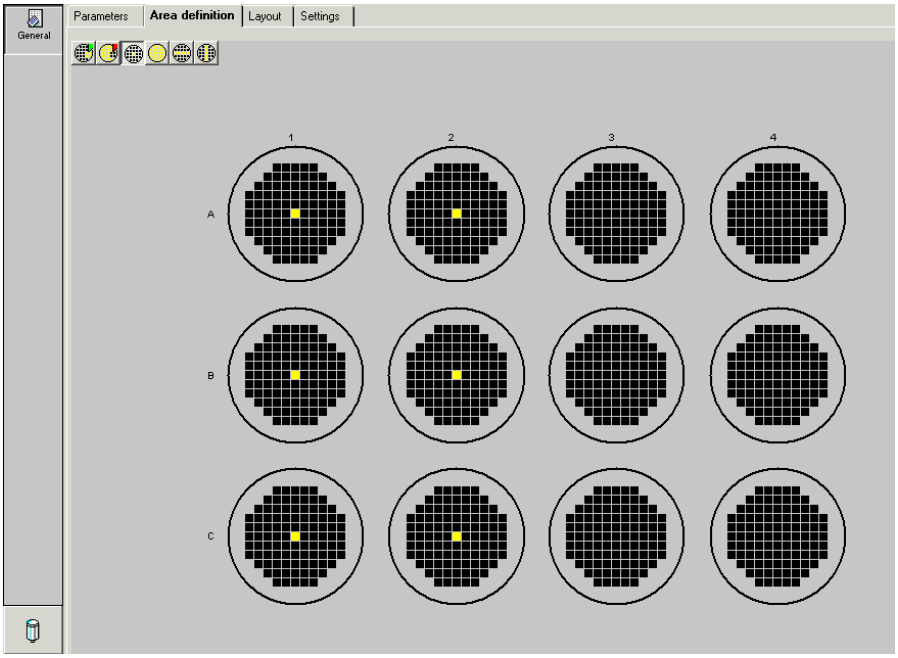
Use this command to define any single points of the wells to be measured.



2.1.5.2.2 Middle Point

Middle Point (Area menu) or

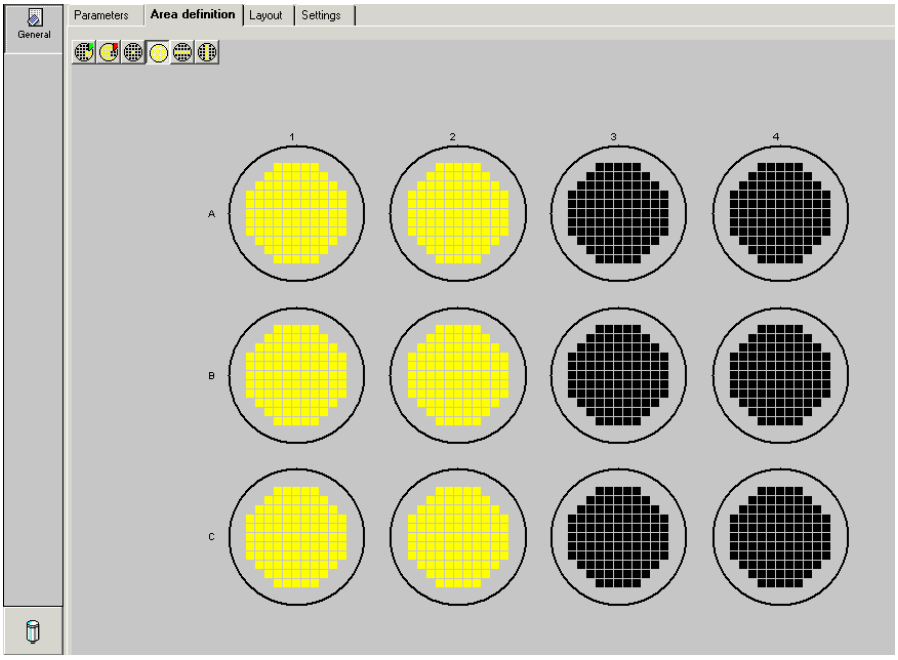
Use this command to define that the middle point of the well is to be measured.



2.1.5.2.3 Whole Well

Whole Well (Area menu) or

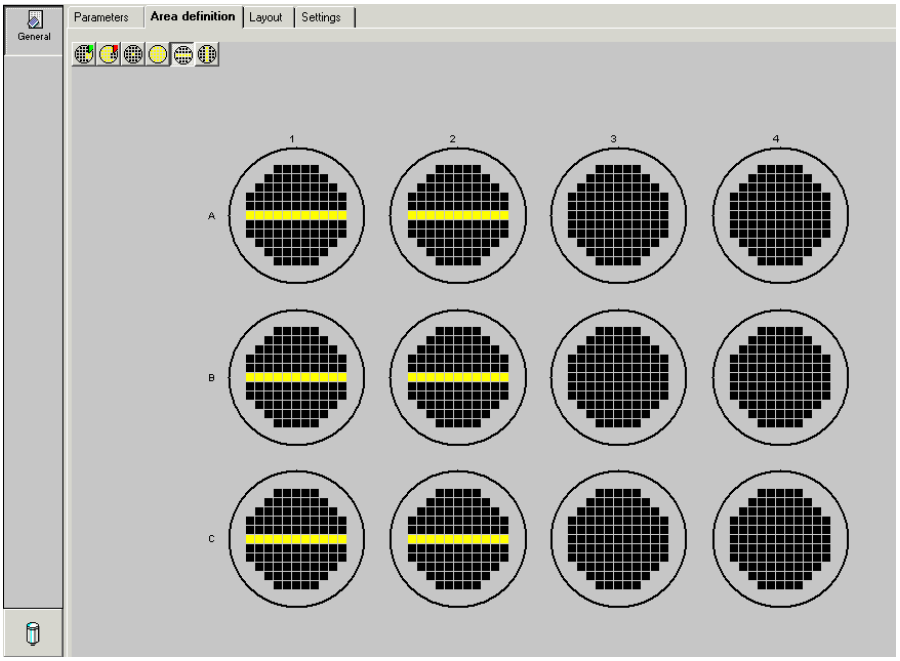
Use this command to define that all the points of the well are to be measured.



2.1.5.2.4 Horizontal Diagonal

Horizontal Diagonal (Area menu) or

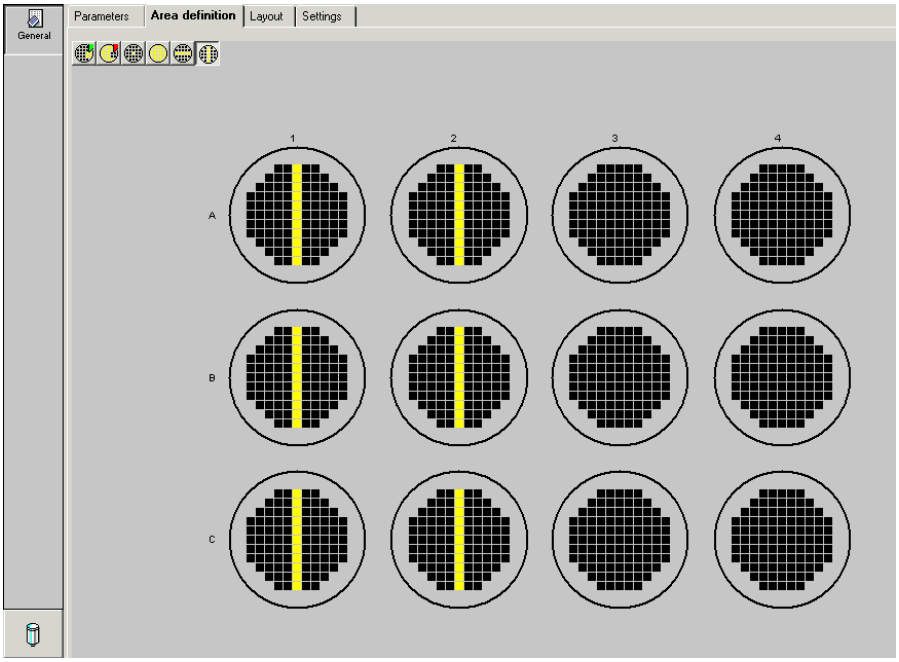
Use this command to define that the horizontal diagonal of the well is to be measured.



2.1.5.2.5 Vertical Diagonal

Vertical Diagonal (Area menu) or

Use this command to define that the vertical diagonal of the well is to be measured.



2.1.5.2.6 Remove

Remove (Area menu) or

Use this button to define the tool to “Remove wells from the measurement area”.

2.1.5.3 Layout

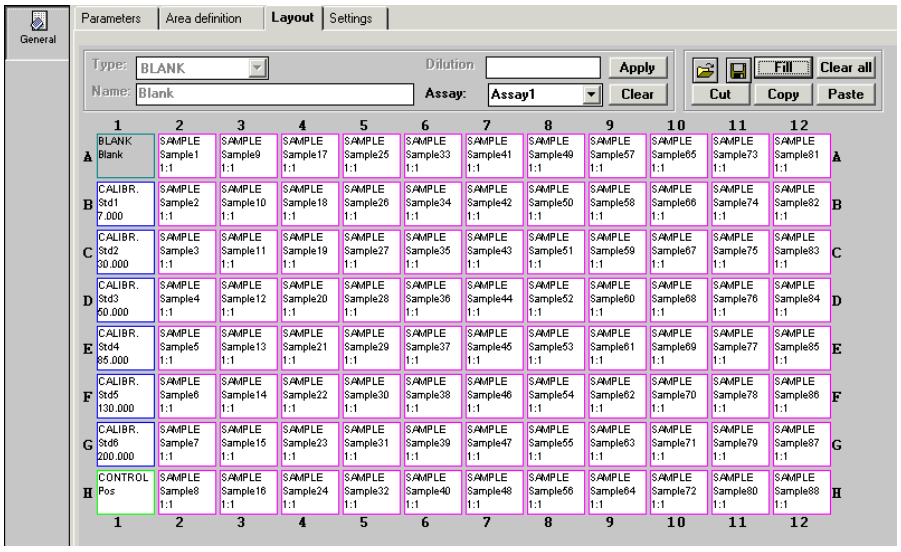
The Layout function allows the user to specify the data of the wells on the microplate. The plate is displayed in the window. The floating menu appears by pressing the right mouse button in the **Layout** window.

The Layout Editor is used to enter and change the well data. The well data can be filled using two different approaches. By using the fields and buttons in the Layout Editor the wells are filled manually (**A**). For a more enhanced filling the **Fill** dialog should be used (**B**). You can change the well type color by selecting **Setup → Color**.

Note: To properly update the existing results sheets, the area definition and the plate layout should match. If there is a mismatch, you might get extra results.

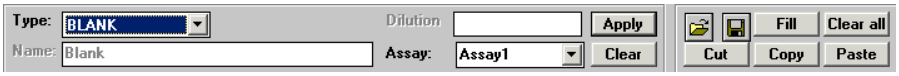
Note: Creating a plate layout is not necessary for basic measurements.

To select the well(s) click one of the wells in the window or keep the left mouse button down and drag it over the wells you want to select.



The well data contains the type and name of the item in the well. The calibrator well data also contains the concentration of the item. The sample well data contains the dilution of the sample.

A. The Layout Editor contains the following buttons and fields:



- **Type.**The type of well is either CALIBR., CONTROL, SAMPLE or BLANK. The type can be changed only when the selected well is empty.

  The colors of the well borders are the same as the defined colors for the different well types (i.e. calibrators, controls, samples and blanks). The borders of empty wells are black. The colors of the different well types can be defined on the **Procedure Desktop** through **Setup → Colors**.

- **Name.** The name of the item. The name "Blank" is allowed only with the type BLANK.

  The maximum length of the name is generally 50 characters, with the exception of the type BLANK. Ascent Software automatically numbers different items, concentrations and dilutions in series. This number is added as an extension to the name given by the user. The numbering of the samples in the dilution series has a space, a running number, a slash, and a running dilution number.

  The user can give a name maximum 50 characters for the type SAMPLE.

  Depending on the characters used, the whole name should be visible in the well data if the length of the name is 9 to 10 characters or less in layout and 9 characters in cell (including running number and dilution). Otherwise the whole name is only displayed in the Name field, and the first 9 to 10 characters are displayed in the well.

- **Concentration/Dilution 1**: The concentration of the calibrator or the dilution of the sample. This data can only be edited when the type is CALIBR. or SAMPLE.

- **Assay**. The name of the assay. You can enter an assay name by editing the field or selecting the assay from the drop-down list. The name of the assay is required when you have several assays on the same plate. The maximum length of the name is 20 characters. Only 10 characters can be displayed in the Assay list.
- **Apply**. Applies the data from the fields to the well.
- **Clear**. Removes the data from the fields of the selected well(s) and their replicates and specific blanks.
- **Open** . Opens the list of layout files. The layout can be selected to the editor from the list. You can open files with the ***.lay** and ***.pla** extensions. The ***.lay** file is a layout file that is automatically generated by Ascent Software whenever a whole session is saved. The ***.lay** file always has the same name as the corresponding session file. The ***.pla** file is a user-generated layout file that is named manually with the **Save As** function.
- **Save As** . Opens the list of layout files. The name of the file to be saved can be typed or selected from the list of existing ***.pla** files. You can save files only with the ***.pla** extension.
- **Fill**. Opens the **Fill** dialog to enable a more automated filling of the wells with user-defined parameters.
- **Clear all**. Clears the whole plate layout.
- **Cut**. Cuts the selected well specifications into the clipboard.
- **Copy**. Copies the selected well specifications into the clipboard.
- **Paste**. Pastes the well specifications from the clipboard.

Fill by using the fields

Select the type of the well from the drop-down list and enter the name of the item. You can also key in a concentration for the calibrator or enter a dilution (1:n) for the sample. You can specify **Assay** for all types of wells. Press the **Apply** button to apply the data to the well(s).

The data of all replicates is changed at the same time (except for the SAMPLE type). The names of the specific blanks are also changed if the name of the original sample is changed.

The editability of the fields depends on the selection in the **Type** field. If several wells of different types are selected with the mouse drag, only **Assay** can be edited. If all the selected wells have the same type and name, **Name** can also be edited. **Concentration**/**Dilution 1**: can be edited when all the selected wells have the same type of CALIBR. or SAMPLE, the same name and the same concentration or dilution.

B. Open the **Fill** dialog by pressing the **Fill** button. The **Fill** dialog contains the following buttons and fields:

- **Type**. The type of well is either CALIBR., CONTROL, SAMPLE or BLANK.
- **Name**. The name of the item corresponds to that in the Layout Editor. The name "Blank" is allowed only with the type BLANK.

  The maximum length of the name is generally 50 characters, with the exception of the type BLANK. Ascent Software automatically numbers different items, concentrations and dilutions in series. This number is added as an extension to the name given by the user. The numbering of the samples in the dilution series has a space, a running number, a slash, and a running dilution number.

  The user can give a name maximum 50 characters for the type SAMPLE.

  Depending on the characters used, the whole name should be visible in the well data if the length of the name is 9 to 10 characters or less in layout and 9 characters in cell (including running number and dilution). Otherwise the whole name is only displayed in the Name field, and the first 9 to 10 characters are displayed in the well.

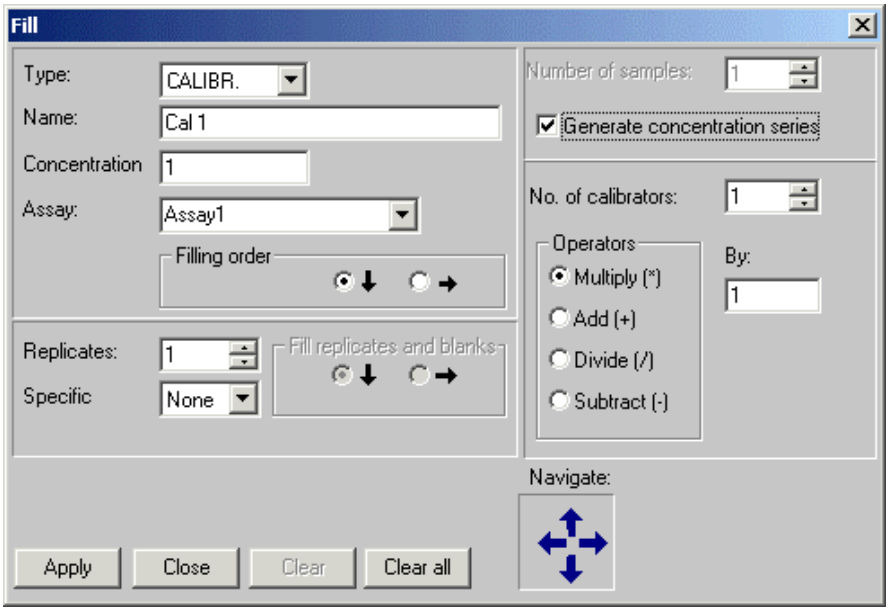
- **Load IDs** (only with SAMPLE type): Loads a list of names from a text file where names are separated by an enter (↵), i.e. all the names are on their own lines:

  ```
  Name1↵
  Name2↵
  Name3↵
  ```
  …etc

- **Concentration/Dilution 1**: The concentration of the calibrator or the dilution of the sample.
- **Assay**. The name of the assay. The name of the assay is required when you have several assays on the same plate.
- **Filling order**. Select the filling order of the item and the calibration/dilution series.
- **Replicates**. The number of replicates of the item.
- **Specific blanks**. The calibrator, control or sample can have none, one, or two specific blank(s).
- **Fill replicates and blanks**. The filling order of the replicates and blanks.
- **Number of samples/controls**. Key in the number of samples or controls when samples and controls are edited. The names of samples and controls are generated automatically by adding a number to the name.
- **Generate concentration/dilution series**. Tick this check box when you want to generate calibration or dilution series.
- **No. of calibrators/dilutions**. Key in the number of calibrators or sample dilutions in the series. The names of the calibrators are generated automatically by adding a running number to the name. Calibrators and sample dilutions are generated automatically.
- **Operators**: **Multiply (*), Divide (/), Add (+), Subtract (-)**. The operators used in the calculation of concentrations in calibration series and in the calculation of dilutions in sample dilution series.
- **By**. The value used in the calculation of concentrations in calibration series and in the calculation of dilutions in sample dilution series.

- **Navigate.** You can move on the microplate in different directions and select a desired well with the **Navigate** arrows.
- **Apply.** Applies the data to the wells according to the field entries.
- **Close.** Closes the **Fill** dialog.
- **Clear.** Removes the data from the fields of the selected well and its replicates and specific blanks.
- **Clear all.** Removes the data from all the wells.

Fill by using the Fill dialog



Only empty wells can be filled with the **Fill** dialog.

Select the type of well from the drop-down list and enter the name of the item.

The additional parameters depend on the type of item.

You can enter the concentration for calibrators. You can enter the dilution (1:n) for samples. The name of the field is automatically **Concentration** for calibrators and **Dilution 1:** for samples.

Enter the name of the assay with the **Assay** field. The maximum length of the assay name is 20 characters.

The filling order of the items can be selected with the **Filling order** buttons either down or across.

Key in the number of replicates. The maximum number of replicates is 30.

Calibrators, controls and samples have no specific blank as default. Then the value in the **Specific blanks** field is "None". Select "One" if the item has one specific blank. Select "Two" if the item has two specific blanks.

The filling order of replicates and blanks can be selected by using the **Fill replicates and blanks** buttons either down or across.

The **Number of samples/controls** field is activated when samples and controls are edited. The names of samples and controls are generated automatically by adding numbers to the name. The maximum number of controls/samples equals the size of the plate.

When you want to generate calibration or dilution series, tick the **Generate concentration/dilution series** check box. The **Generate concentration/ dilution series** check box activates the other fields, e.g. **No. of calibrators/dilutions**.

When the type of well is "CALIBR.", you can enter the number of calibrators used in the calibration series in the **No. of calibrators/dilutions** field. The names of the calibrators are generated automatically by adding numbers to the item name. Alternatively, when the type of well is "SAMPLE", you can enter the number of dilutions used in the dilution series. The names are not generated but the dilution series is made for the same item.

In the *calibration series* the concentrations are calculated according to the operators **Multiply (*)**, **Divide (/)**, **Add (+)** or **Subtract (-)**. The

calculation is made by using the basic value in the **Concentration/Dilution 1:** field and the value in the **By** field.

In the dilution series the dilutions are calculated according to the operators **Multiply (*)**, **Divide (/)**, **Add (+)** or **Subtract (-)**. The calculation is made by using the basic value in the **Concentration/Dilution 1:** field and the value in the **By** field.

The filling order of the item in the series can be selected with the **Filling order** buttons either down or across.

Navigate enables the user to move on the microplate in different directions and select a desired well with the **Navigate** arrows.

Press the **Apply** button to apply the data to the well(s). Only empty wells are filled; reserved wells are not overwritten.

Press the **Close** button when you want to close the **Fill** dialog.

Press the **Clear** button to remove data from the fields of the selected well and its replicates and specific blanks.

Press the **Clear all** button when you want to empty all the data of the wells on the plate.

Note: The user can get a printout of the plate layout in **Steps → Print Current Step**.

Activeness of fields

The **Type** field can be selected when the plate contains at least one empty well.

The editability of fields depends on the selection in the **Type** field.

The **Name** field can be edited when the type is not BLANK.

The **Load IDs** button is active when type is SAMPLE.

The **Concentration** field can be edited when the type is CALIBR..

The **Dilution 1**: field can be edited when the type is SAMPLE.

The **Assay**, **Filling order** and **Replicates** fields can always be changed.

The **Specific blanks** field can be selected when the type is not BLANK.

The **Fill replicates and blanks** buttons can be selected when there is more than one replicate or specific blank.

The **Number of samples/controls** field can be edited when the type is SAMPLE or CONTROL.

The **Generate concentration/dilution series** check box can be selected when the type is CALIBR. or SAMPLE.

The fields belonging to series can be edited when the **Generate concentration/dilution series** check box is selected.

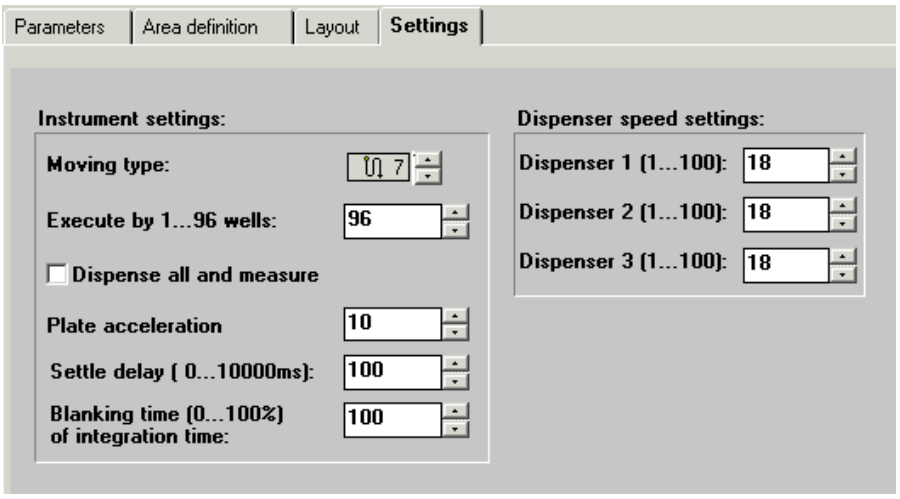
In other words, the **No. of calibrators/dilutions**, **Operators** and **By** fields are active when **Generate concentration/dilution series** is checked.

The **Navigate** arrows are constantly active.

The **Apply** and **Close** buttons are active on every occasion and the **Clear all** button is inactive only when the plate is empty. **Apply** is inactive when all wells have been specified.

The **Clear** button is active when the selected well contains data.

2.1.5.4 Settings



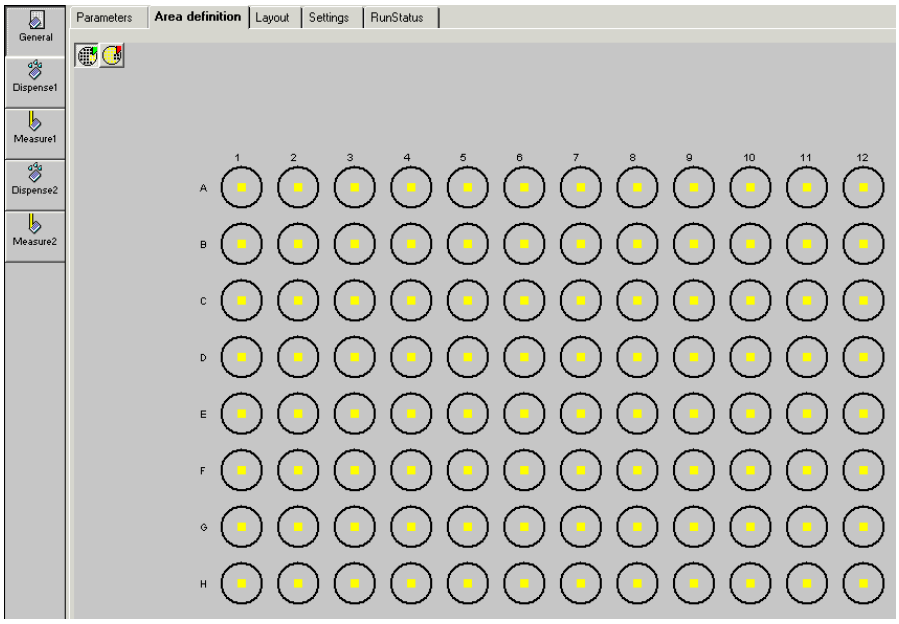
The instrument settings are:

- **Moving type**. The program searches for wells to dispense/measure in the order defined by this input field. If the Moving type has been selected as above, the columns may not actually be measured in opposite directions unless adjacent columns are selected.

  If a well has several measurement points defined, the points within the well are measured using the same Moving type as defined for the wells.

- **Execute by 1...n wells**. The Execute by 1...n wells setting defines the size of a group of wells. As many wells as defined by this field are measured/dispensed at a time. The default group size is the number of wells on the plate, which means that all the wells are measured/dispensed in one pass of the session steps. If the group size is less than the total number of wells on the plate, the steps of the session are repeatedly run until all the selected wells are measured/dispensed. Suppose that you have a 96-well plate and have selected all the wells. Setting Execute by 1...n wells to 8 means that the steps are repeated 12 times and 8 wells are measured in each pass.

For example, when the user has defined the following session using moving type 5:



The instrument will perform the following actions with different **Execute by 1…n wells** settings:

Execute by 1...n wells setting		
1 well	**8 wells**	**96 wells**
Dispense1 for well A1 ⇓ Measure1 for well A1 ⇓ Dispense2 for well A1 ⇓ Measure2 for well A1 ⇓ Dispense1 for well B1 ⇓ Measure1 for well B1 ⇓ Dispense2 for well B1 ⇓ Measure2 for well B1 ⇓ Dispense1 for well C1 ⇓ Measure1 for well C1 ⇓ Dispense2 for well C1 ⇓ Measure2 for well C1 ⇓ etc until well H12	Dispense1 for wells A1 – H1 ⇓ Measure1 for wells A1 – H1 ⇓ Dispense2 for wells A1 – H1 ⇓ Measure2 for wells A1 – H1 ⇓ Dispense1 for wells A2 – H2 ⇓ Measure1 for wells A2 – H2 ⇓ Dispense2 for wells A2 – H2 ⇓ Measure2 for wells A2 – H2 ⇓ Dispense1 for wells A3 – H3 ⇓ Measure1 for wells A3 – H3 ⇓ Dispense2 for wells A3 – H3 ⇓ Measure2 for wells A3 – H3 ⇓ etc until well H12	Dispense1 for wells A1 – H12 ⇓ Measure1 for wells A1 – H12 ⇓ Dispense2 for wells A1 – H12 ⇓ Measure2 for wells A1 – H12

- **Dispense all and measure.** If Dispense all and measure is selected, all the wells defined e.g. by **Execute by 1...96 wells** will be dispensed and after that the defined wells will be measured. If Dispense all and measure is not ticked, the instrument dispenses and measures one well at a time before moving on to the next one.
- **Plate acceleration (1...10).** Defines the acceleration used for plate movements. Acceleration can be varied between setting 1 (0.05 m/s^2) and setting 10 (0.5 m/s^2). The highest acceleration can be used for small wells, such as on the 96-well plate. Lower accelerations are used for larger wells as default values. With high viscosity or solid samples, e.g. agar, higher than default acceleration speeds can be used. The acceleration setting also affects the maximum speed of the plate, the lower the acceleration, the lower the plate speed.

- **Settle delay (0…10000 ms)**. Defines the time the instrument will wait at each well after a plate movement before it starts to measure.
- **Blanking time (0…100%) of integration time** (Fluoroskan Ascent FL only). Defines the integration time used in automatic blanking of the instrument background. The instrument performs automatic blanking before and after each execution group (the **Execute by 1...n wells** setting). As a default, this blanking uses the same integration time as the actual measurement step so that 50% of the integration is performed before and 50% after the execution group. With this setting, the user can reduce the time spent for automatic blanking.

  For example, if the **Execute by 1…n wells** setting is one and the user has defined a 10 s integration time, the instrument will perform a 5 s blanking before and after each well. If one defines here a blanking time setting of 20%, the instrument will perform only a 1 s blanking before and after each well. If the setting is zero, then automatic instrument blanking is totally prevented.

The **Dispenser speed settings** options are:

With these settings you can adjust the speeds of the optional dispensers to gain optimal dispensing results. The default setting 18 is suitable for a viscosity equal to that of water. The dispenser speed setting defines the speed as % of the maximum possible speed with that dispenser.

- **Dispenser 1 (1...100)**. Defines the dispensing speed of dispenser number 1.
- **Dispenser 2 (1...100)**. Defines the dispensing speed of dispenser number 2.
- **Dispenser 3 (1...100)**. Defines the dispensing speed of dispenser number 3.

2.1.5.5 RunStatus

RunStatus is the Status report of the last run of the Session. If the session has not been run, the RunStatus tab is not visible on the **Procedure Desktop**. RunStatus is generated both in **Procedure Desktop** and **Results Desktop**. They are exactly identical except for the grid lines in the RunStatus sheet generated on the **Results Desktop**. The RunStatus sheet provides summary information on the session and comprises the session name, program version, instrument type and serial number, starting time of the run and the actual temperature. The RunStatus report also includes data about the steps. In addition, the RunStatus sheet reports the ending time of the run, number of warnings and errors and the actual temperature.

Example printout

Session:	C:\ASCSW26\DEFAULTC.SEC
Program version:	Ascent Software Version 2.6
Instrument:	Fluoroskan Ascent FL 0.0-0
Serial no:	0000-000
Started at:	28/02/02 15:54:03PM
Actual temperature:	Amb.temp.
Beam width:	Normal beam
Dispensers:	1,2,3
Measure1	
Started at:	28/02/02 15:54:03PM
Actual temperature:	Amb.temp.
Run Done:	28/02/02 15:54:05PM
Total warnings:	0
Total errors:	0
Actual temperature:	22.0°C

2.1.5.6 Measure

Measure (Steps menu) or

Use this command to add a Measure (measurement) step to the Steplist. The following measurement types are available:

- **Single**
- **Dual**
- **Kinetic**
- **Dual kinetic**
- **Scanning**
- **Monitor**

Single measures each well once with the defined integral time. This measurement type equals a basic end point measurement.

The **Dual** measurement type performs a double end point measurement with a defined interval time between the two measurements. Each well is measured twice and the measurement can be performed with two different filter pairs/filters.

In the **Kinetic** measurement type several measurements are taken from the selected wells using the defined interval time. The Kinetic measurement type is used for the detection of kinetic reactions. In the Kinetic measurement type any number of wells from 1 to 384 are measured continuously for a defined number of measurement points.

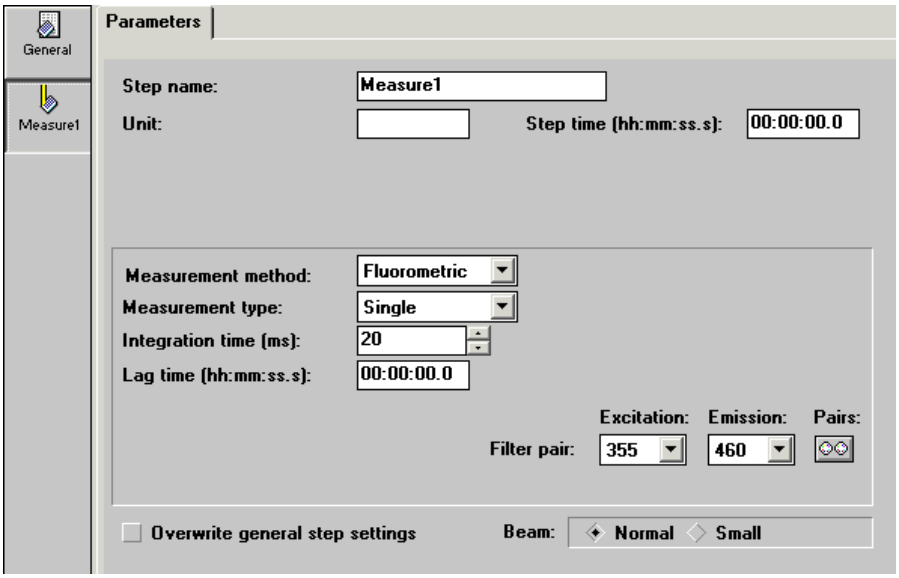
The **Dual kinetic** measurement type is a combination of the **Dual** and the **Kinetic** measurement types. Two readings are taken several times from each measurement point using the defined interval time.

The **Scanning** measurement type is similar to **Single** except that the plates are read without stopping the plate movement.

The **Monitor** measurement type measures the point a defined number of times. Monitor is intended for the detection of very fast kinetic signals where the total reaction time is less than about 20 s.

2.1.5.6.1 Single

In the Single measurement type the selected wells are measured once. A single measurement result is taken from each measurement point.



The general parameters for all the measurement types are:

- **Step name.** The name of the step. The name is generated automatically or given by the user and must be unique.
- **Unit.** The measurement unit for the reading. You can enter a nine-character long string as the name of the unit.
- **Step time (hh:mm:ss.s).** The time spent before advancing to the next step. The time is expressed as hh:mm:ss.s, where hh stands for hours, mm for minutes, ss for seconds and s for milliseconds.
- **Measurement method (FL only).** Selection of the measurement method, either fluorometric or luminometric.
- **Measurement type.** The measurement type is selected (e.g. Single).
- **Integration time** (from 20 ms to 1000 ms in the fluorometric method, and from 20 ms to 1 h in the luminometric method with the measurement type **Single**/**Execute by 1...n wells** and from 20 ms to

10 s with other parameters in the luminometric method). Defines the length of time used to obtain one measurement result from a measurement point. The minimum time is 20 ms during which time the instrument sums 150 readings from the A/D converter. If the integration time is longer, the result is the mean value of the number of 20 ms readings during the total integration time. For example, if a 100 ms integration is used, the result is:

(150 readings + 150 readings + 150 readings + 150 readings + 150 readings) / 5

Longer than 20 ms integration times can be used to reduce background noise if the signal level of the sample is very low.

- **Lag time (hh:mm:ss.s).** The time before the measurement is started.
- **Overwrite general step settings**. By checking this check box you can define the area and the plate layout for this step different from those defined in the **General** step. When Overwrite general step settings is selected, the area definition, layout and the settings of the **General** step are used as default for the current step. These parameters can, however, be edited suitable for the step in question.

The fluorometric parameters are:

- **Filter pair**. The wavelength for the filter pair expressed in nanometers. Select the appropriate wavelength from the drop-down list.
- **Beam.** Normal or Small beam selection. If the beam of the instrument is changed, the beam state is updated. If the beam in any **Measure** or **Dispense And Measure** step does not match the current beam when the session is started, an error is reported.

The luminometric parameters are (FL only):

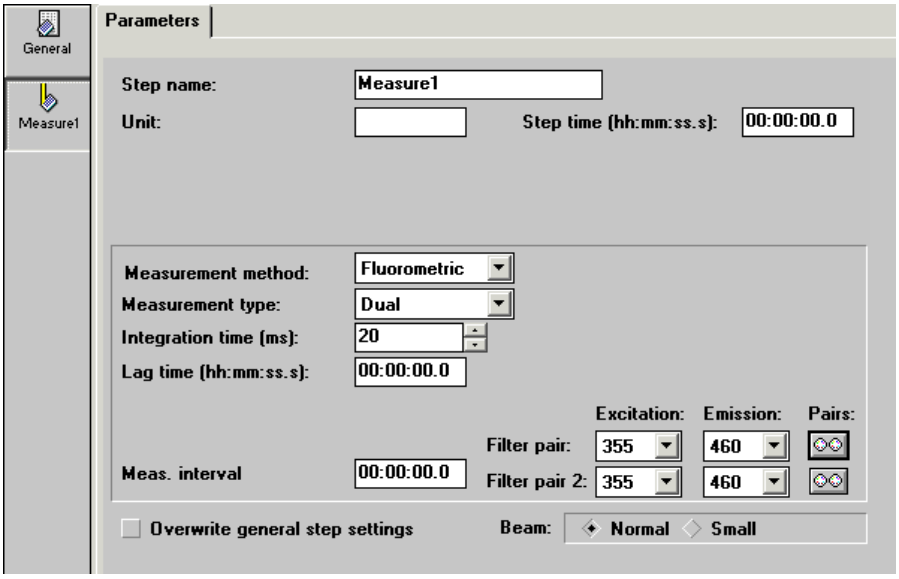
- **Filter.** The wavelength for the filter expressed in nanometers. Select the appropriate wavelength from the drop-down list. The default filter is “None” in luminometric measurements.
- **Use default PMT voltage.** By selecting this check box, the standard factory calibration PMT (photomultiplier tube) voltage is used in the measurements. This is selected as default and it gives the best

possible performance for luminometric measurements. The software obtains the actual voltage from the instrument and it can be viewed in the **Instrument Status** sheet.

- **PMT voltage.** If the **Use default PMT voltage** check box is deselected, you can change the PMT voltage value from 300 to 1000. The initial value is factory-calibrated. Changing this value may become necessary if very high signals are measured.

2.1.5.6.2 Dual

In the Dual measurement type each point is measured twice using two different filters (luminometric)/filter pairs (fluorometric), at first with one filter/filter pair and then with another. **Meas. interval** defines the interval time between the two measurements.



For more details on general parameters, see section **Single** on p. 2-38.

The specific parameters in the Dual measurement type are:

- **Meas. interval (hh:mm:ss.s).** The time interval between the measurements.

The fluorometric parameters are:

- **Excitation.** The wavelength of the first excitation filter.
- **Emission.** The wavelength of the first emission filter.
- **Excitation 2.** The wavelength of the second excitation filter.
- **Emission 2.** The wavelength of the second emission filter.

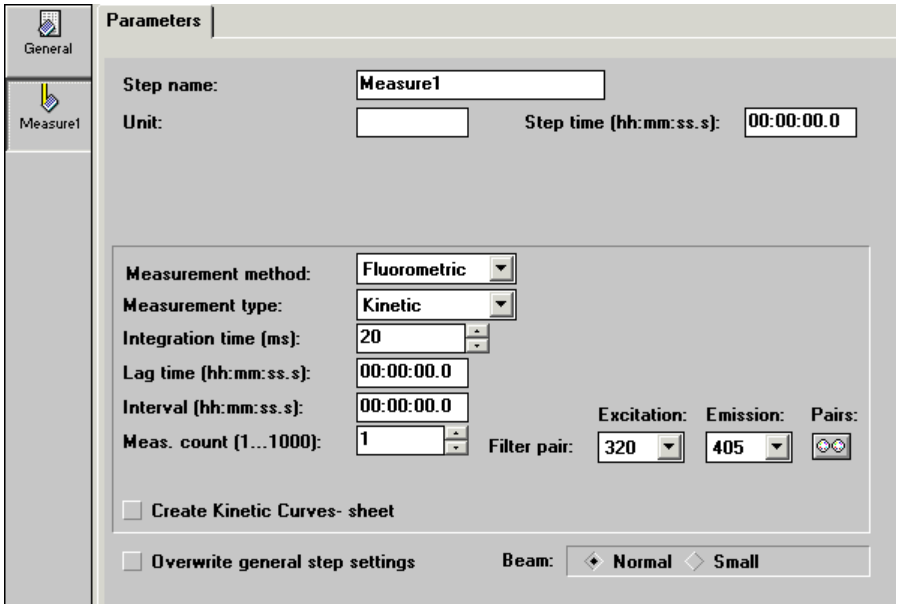
The luminometric parameters are (FL only):

- **Filter 1 & 2.** The wavelengths for the first and second measurement filters.

For other parameters, see section **Single** on p. 2-38.

2.1.5.6.3 Kinetic

In the Kinetic measurement type several measurements are taken from the selected wells using the defined interval time. The number of readings is defined in the **Meas. count** field.



The general parameters for all the measurement types are described in the **Single** section. The specific parameters for the Kinetic measurement type are:

- **Interval (hh:mm:ss.s).** The time between the successive readings.
- **Meas. count (1...1000).** The number of consecutive measurements.
- **Create Kinetic Curve-sheet.** Automatically copies kinetic curves and pastes them on a new sheet named [Measure] Curves on the **Results Desktop**.

2.1.5.6.4 Dual kinetic

The Dual kinetic measurement type is a combination of the **Dual** measurement type and the **Kinetic** measurement type. Two readings are taken several times from each measurement point using the defined interval time and the two selected filters/filter pairs.

The parameters for the Dual Kinetic measurement type are the same as for those in the **Kinetic** measurement type except that two filters/filter pairs are used instead of one filter/filter pair. For more information about parameters, see the **Kinetic**, **Dual** and **Single** (on p. 2-38) measurement types.

2.1.5.6.5 Scanning

Scans over the given area.

The Scanning measurement type is similar to **Single** except that the points are read while the plate is moving. This mode is useful for large wells with a lot of measurement points. Use low acceleration if the well contains a liquid of low viscosity.

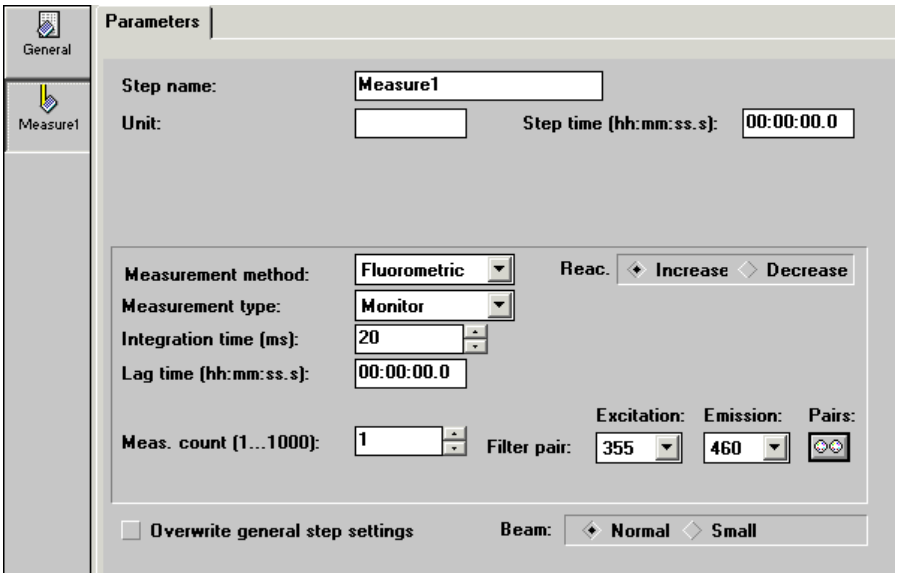
The parameters for the Area scanning measurement type are the same as for the measurement type **Single**.

Note: In Scanning mode, the maximum **Integration time** is 860 ms (FL only).

2.1.5.6.6 Monitor

The Monitor measurement type is a special measurement type for *fast kinetic reactions* (total reaction time *ca.* < 20 s) that measures the well a defined number of times.

In the Monitor measurement type one well at a time is measured. When you dispense into a well and want to follow fast reactions, Monitor is the correct choice. After the well has been measured, the instrument continues to the next well.



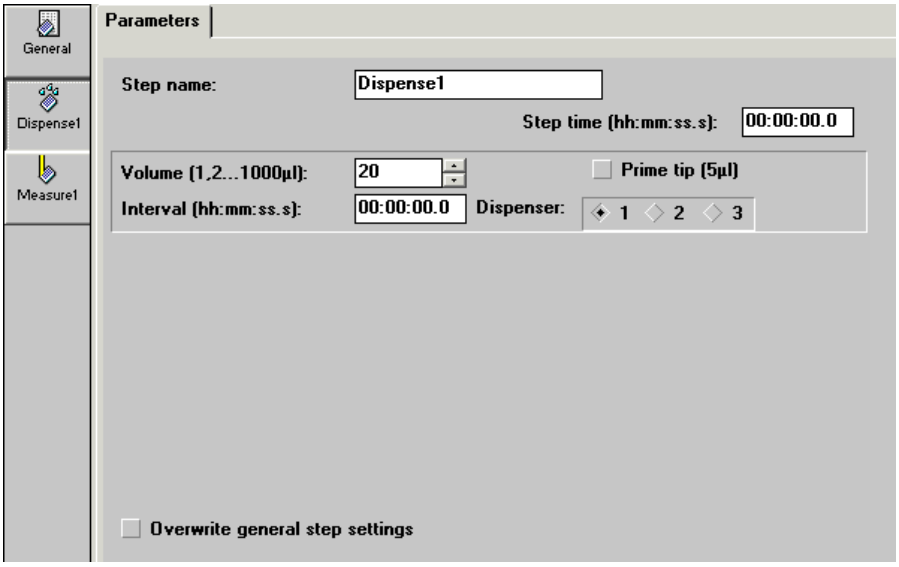
A specific parameter for this measurement type is:

- **Meas. count (1...1000).** Total number of readings taken from the points.

2.1.5.7 Dispense (not CF)

Dispense (Steps menu) or

Use this command to add a Dispense step to the Steplist.



The parameters for the Dispense step are:

- **Step name.** The name of the step. The name is generated automatically or given by the user and must be unique.
- **Step time (hh:mm:ss.s).** The time spent before continuing to the next step.
- **Volume (1, 2…1000 µl).** Defines the dispensing volume in steps of 1 µl increments.

Note: The resolution of the dispensing volume is 1 µl, but the accuracy of the dispensers is not as precise. Refer to the instrument manual for deatails on dispenser specificatios.

- **Interval (hh:mm:ss.s).** Defines the dispensing time interval between the wells.

- **Prime tip (5 µl).** Primes 5 µl to the waste wells after each aspiration. With small dispensing volumes this improves the dispensing precision of the first dispensing after aspiration.
- **Dispenser (from 1 to 3).** The number of the dispenser used.
- **Overwrite general step settings.** By checking this check box you can define the area and the plate layout for this step different from those defined in the **General** step. When Overwrite general step settings is selected, the area definition, layout and the settings of the **General** step are used as default for the current step. These parameters can, however, be edited suitable for the step in question.

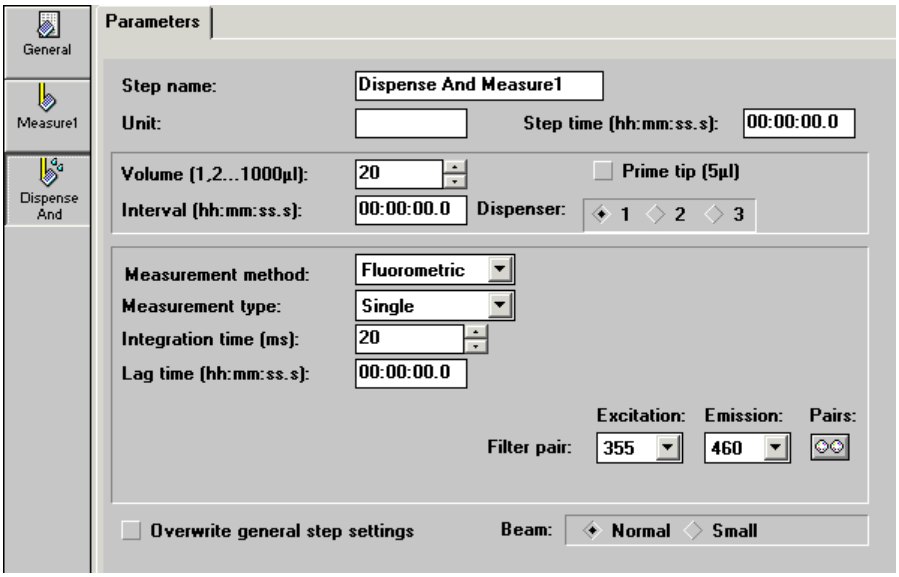
2.1.5.8 Dispense And Measure (not CF)

Dispense And Measure (Steps menu) or

Use this command to add a Dispense And Measure step to the Steplist. With this step dispensing and measuring can be accurately timed, as with separate **Dispense**/**Measure** steps timing is less accurate.

It is possible to measure simultaneously while dispensing using this step. Simultaneous measuring and dispensing is possible when the dispenser is in the M position, in addition to the measurement type being either **Single** or **Monitor**. To avoid splashing in larger wells, the dispensing is always carried out in such a manner that the injected squirt hits the side wall of the well when possible. This requires moving the plate between dispensing and measuring if the measuring point is not in the correct position during dispensing. In this case the plate must be moved to the measuring position, which causes a delay of about 0.15 s between the dispensing and measurement. For standard 96-well plates, moving the plate is not required and simultaneous measurement and dispensing is possible.

Note: The check box **Dispense all and measure** in **General** step **Settings** affects the Dispense And Measure step (see **General** step **Instrument Settings** in the **Overview** part of the manual).



The step is a combination of a **Dispense** step and a **Measure** step.

The parameters for the Dispense And Measure step are:

- **Volume (1, 2...1000 µl).** Defines the dispensing volume in steps of 1 µl increments.
- **Interval (hh:mm:ss.s).** Defines the dispensing interval between the wells.
- **Prime tip (5 µl).** Primes 5 µl to the waste wells after each aspiration. With small dispensing volumes this improves the dispensing precision of the first dispensing after aspiration.
- **Dispenser (from 1 to 3).** The number of the dispenser you are using.
- **Measure.** The Measure part is the same as that of a **Measure** step. It contains the selection of either the fluorometric or luminometric method (FL only). The following measurement types with their own parameters are:
    - **Single**
    - **Dual**
    - **Kinetic**

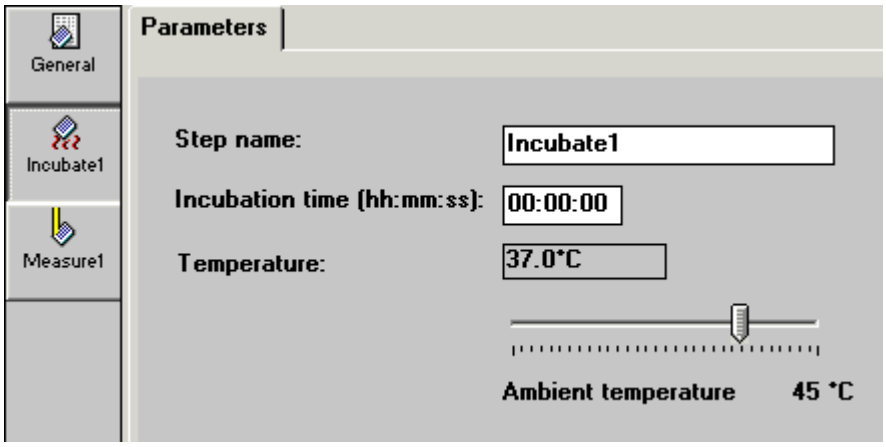
- **Dual kinetic**
- **Scanning**
- **Monitor**

- **Overwrite general step settings.** By checking this check box you can define the area and the plate layout for this step different from those defined in the **General** step. When Overwrite general step settings is selected, the area definition, layout and the settings of the **General** step are used as default for the current step. These parameters can, however, be edited suitable for the step in question.

2.1.5.9 Incubate

Incubate (Steps menu) or

Use this command to add an Incubate step to the Steplist.



The parameters of the Incubate step are:

- **Step name.** The name of the step. The name is generated automatically and must be unique.
- **Incubation time (hh:mm:ss).** Defines the time before the next step is executed. If the value is zero, the incubation is switched on and the execution of the next step starts immediately.

Note: To switch the incubation off, add an Incubate step and set the **Temperature** to **Ambient temperature** (amb.temp.).

- **Temperature.** You can set the incubation temperature by sliding the temperature regulator (from ambient temperature to +45°C).

Note:

- The temperature inside the instrument is approx. +3°C above the ambient temperature.
- The following exception for Incubate steps applies: Incubate steps with an *Incubation time* of zero are executed only once. These are only used in order to break a loop.
- Use the mouse or keyboard keys to set the temperature. First choose the temperature selector by using the mouse or tab key.

Keys	Step °C	Direction
Arrow key left	0.1	Down
Arrow key right	0.1	Up
Page Up	1	Down
Page Down	1	Up
Home	Amb.temp.	Down
End	45	Up

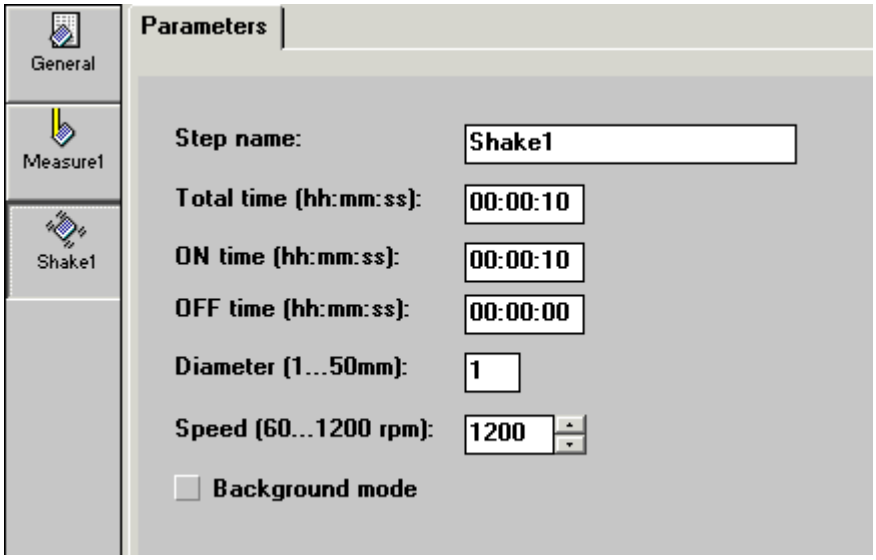
If the instrument is always used at a higher temperature than ambient temperature, it is convenient to select set **Startup temperature** from the Options (on p. 2-77) menu, and no separate incubation step is then required. Use **Options → Startup temperature** to warm up the instrument.

Note: The incubation will be turned on until Ascent Software is switched off.

2.1.5.10 Shake

Shake (Steps menu) or

Use this command to add a Shake step to the Steplist.



The parameters of the Shake step are:

- **Step name.** The name of the step. The name is generated automatically and must be unique.
- **Total time (hh:mm:ss).** The duration time of the total Shake step.
- **ON time (hh:mm:ss).** The ON time of the shaking period. The ON time must always be given so that the instrument will shake. The other shake parameters mentioned are just for the fine-tuning of the instrument.
- **OFF time (hh:mm:ss).** The OFF time of the shaking period. The Shake step is broken up into intermittent ON and OFF times.

- **Diameter (1...50 mm).** Defines the shaking amplitude.
- **Speed (60...1200 rpm).** Defines the shaking speed.
- **Background mode.** The shaking is carried out when the instrument does not have any other tasks to perform, e.g. during lag times.

Note: Different time settings will affect the way the program performs tasks.

Examples of setting up time parameters

1. Interval shaking

If, for example, the **Total time** equals 30 s, the **ON time** 10 s and the **OFF time** 5 s, then the instrument:

shakes 10 s ⇒	is idle 5 s ⇒	shakes 10 s ⇒	is idle 5 s =	total 30 s

2. Background shake in a kinetic measurement

a) Shaking would normally start as soon as the instrument is idle, i.e. right after the measurement if the **OFF time** equals zero. If you want the shaking to commence at a set time before the measurement, and wait the remaining interval time before the next kinetic measurement, then setting the **Total time** is not necessary. The **ON time** equals the length of time the instrument shakes before the measurement. The **OFF time** has to be set greater than the lag time or interval times of the **Measure** steps.

b) Kinetic measurement, shake before each count: setting up a session with having the instrument shake right before each measurement count:

interval time	background shake	Measure	interval time	background shake	Measure

A Shake step with **Background mode** and the following time settings:

Total time not needed;

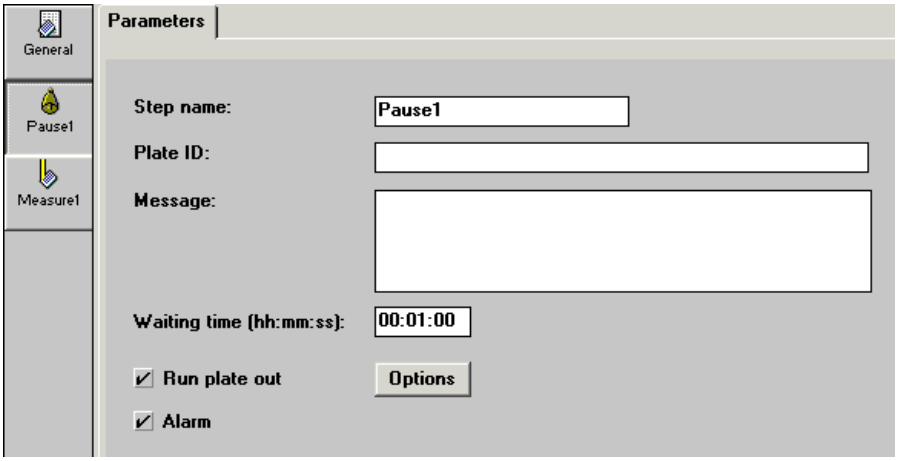
ON time = How long you want the instrument to shake, here 30 seconds, and

OFF time = If zero, will start shaking as soon as the instrument is idle, which means that the shaking starts at the beginning of the Measure step's lag or interval time. If the OFF time is greater than the lag time or the interval time, then the shaking will commence at the time set for the **ON time** right before the measurement.

2.1.5.11 Pause

Pause (Steps menu) or

Use this command to add a Pause step to the Steplist.



The parameters of the Pause step are:

- **Step name.** The name of the step. The name is generated automatically or given by the user and must be unique.
- **Plate ID.** A plate ID can be added. It will be written in the Steps sheet on the **Results Desktop**.

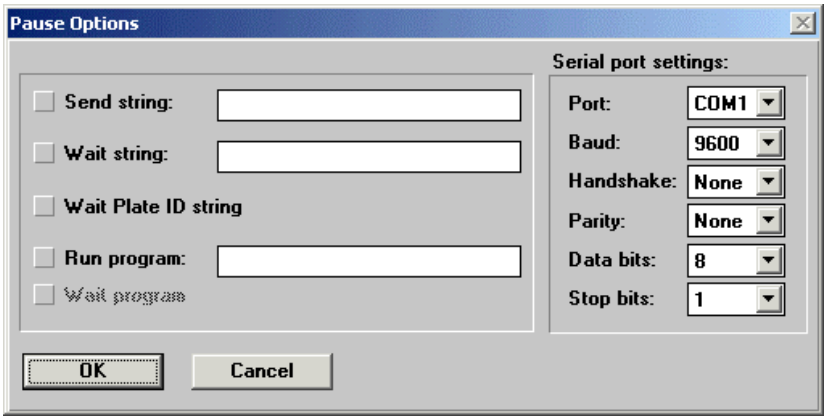
Note: The plate ID can be referenced in the custom-made report sheets or in the comment fields on the **Results Desktop** by typing **=Steps!Pause1_Plate_ID** into a cell.

- **Message.** The message displayed to the user when the Pause step is executed.
- **Waiting time (hh:mm:ss).** The Waiting time allows the user to perform tasks while the plate is out between measurements. After the given time the execution of the session continues. The execution of the steps continues automatically after a given Waiting time.
- **Run plate out.** Runs the plate out if this check box is selected when the Pause step is executed. This check box option is useful, e.g. when manual addition of liquids is required. First tick the check box to enable to send out the microplate between the two measurements. Then set the time between the measurements in the **Waiting time** field.

Note: Especially in some instances where it might be difficult to estimate the **Waiting time** correctly, set the **Waiting time** to zero and manually control the Pause step execution by pressing the **Continue** button (see next page), when desired.

- **Alarm.** Issues an alarm if this check box is selected when the Pause step is executed.
- **Options.** This window is used e.g. when communication between two programs or systems is necessary, or waiting for a string from a barcode reader.

  When the **Options** button is pressed:



The following **Pause Options** are available:

- **Send string**. Sends a string to the serial port when the Pause step starts.
- **Wait string**. Waits for a string from the serial port and continues the execution after it has been received.
- **Wait Plate ID string**. Waits for a string from a barcode reader.
- **Run program**. Starts a program when the Pause step commences. In the Run program option, you have to type the name of the program you want to run in the field. The name may include path and command line arguments.
- **Wait program**. Waits for the started program to terminate and then continues the execution. The option Wait program is available only if you have selected the option **Run program**.

Even if one or more of the wait options you have selected are not yet completely executed, you can continue manually by clicking the **Continue** button when the Pause dialog appears. A "Waiting..." message is displayed if the Pause step is waiting for a string, program or a waiting time. If you have selected two or three of the waiting options, the execution continues at the first wait-end condition.

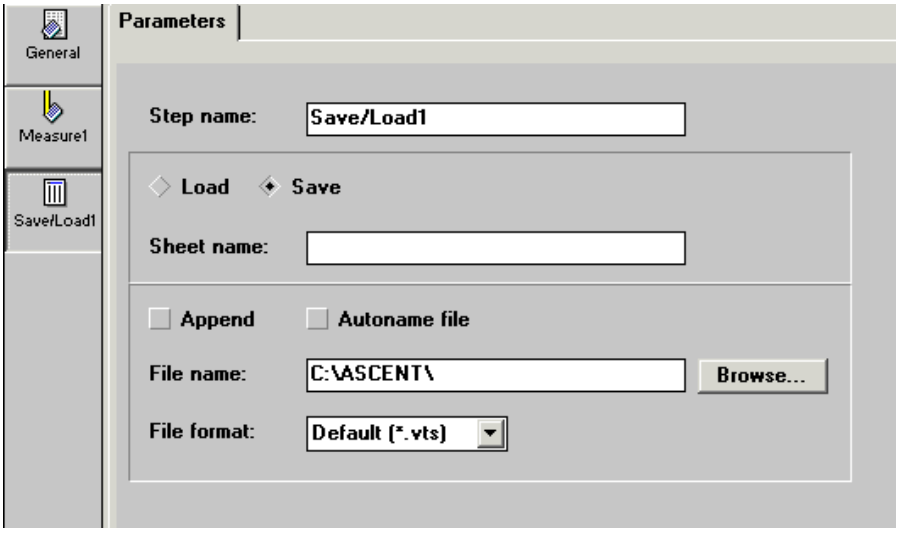
- **Serial port settings**. From **Serial port settings** the user can select the correct communication parameters. For **Send string** and **Wait string** you have to select the proper serial port

settings in the dialog. You cannot send to or receive from the instrument that Ascent Software is controlling. You can insert control characters into the **Send string** and **Wait string** input fields by first entering ^ (= Ctrl) and then a character with the ASCII value 64 + the ASCII value of the control character you want. For example, ^M is the carriage return (CR) and ^J is the line feed (LF). The last character in the **Wait string** input field should be unique for **Wait string** or the string will not be detected even if it has been received.

2.1.5.12 Save/Load

Save/Load (Steps menu) or

Use this command to add a Save/Load step to the Steplist.



The parameters of the Save/Load step are:

- **Step name.** The name of the step. Different Save/Load steps do not require unique step names.
- **Load.** Loads data from a file. When the data is loaded, it is created in a sheet on the **Results Desktop**.

- **Save.** Saves a sheet as a file. When the sheet is saved, it must exist on the **Results Desktop**. The **Steps** sheet shows the filename of the saved sheet.

Note: When the Measure sheet is saved in *.txt and *.xls (worksheet) file formats, it will contain hidden measurement times and plate layout information.

- **Sheet name.** Optional if loading data. A sheet with the given name will be created on the **Results Desktop** that contains data from the loaded file. Case-sensitive if saving data. The **Sheet name** must be written exactly as it was on the **Results Desktop**.
- **Append.** If the Append check box is selected, the sheet will be saved to the end of the file after all the previous data. In this way many sheets can be saved in the same file. The extension *.txt is the only extension allowed for the Append file format.

Note: In many cases it is advisable to create a new sheet (**Results → Sheet → New**) to obtain the **Append** file in the desired format.

- **Autoname file.** This check box is only enabled when the Save sheet is selected. The directory path is given and the name of the file is generated from the current date and time. The name format is MMddhhmm, where MM is the month, dd the day, hh the hours, and mm the minutes.

Note: **Append** and **Autoname file** cannot be on at the same time.

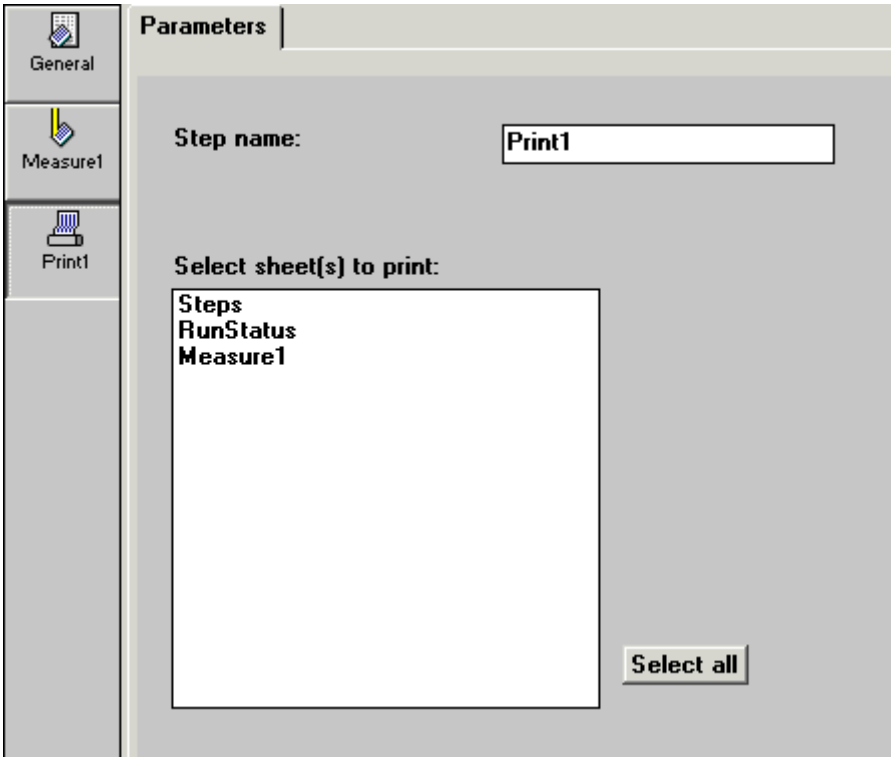
- **File name/Directory path.** The name of the file that the sheet is loaded from or saved in. An extension is not required, but if given, it must match the selected file format. The filename should be written here exactly the same as the actual filename on the disk. The directory path is given when **Autoname file** is ticked.
- **Browse... .** The file or the directory path can be selected from the file or directory list.
- **File format.** You can select the File format from three alternative choices: Default; Excel 4.0, and ASCII text. Default is the natural format for the Ascent sheets. The filename extension is .VTS. Excel 4.0 can be used to transfer data between Ascent Software and Microsoft Excel. The filename extension is .XLS. The tabbed text is an ASCII format where the rows are represented by a line of text

ending with LF. The columns in each row are separated by a TAB character and the extension is .TXT. Most spreadsheet programs can import this kind of file, and the file can also be edited with text editors like MS Notepad or word processors such as MS Word. Remember to keep the file extension as *.txt.

2.1.5.13 Print

Print (Steps menu) or

Use this command to add a Print step to the Steplist.



The parameters of the Print step are:

- **Step name**. The name of the step. Different Print steps do not require unique step names.

- **Select sheet(s) to print.** The sheets to print can be selected from the list.
- **Select all.** With the Select all button, all the sheets are selected to be printed.

The Print step is executed after all the other steps. The sheets are printed using the system printer. See Section **Before Installation** in the **Overview** part of the manual.

Note: Sheets are printed according to the current print area. It is recommended to check and/or modify the print area (**Results Desktop**: **Print → Set Print Area**) before running the session.

2.1.5.14 Remove

Remove (Steps menu)

Use the Remove command to remove a step from the Steplist or simply drag it into the Remove box at the bottom of the Steplist.

2.1.5.15 Inactivate

Inactivate (Steps menu)

The Inactivate command is used if the user chooses not to carry out the step. If the step is inactivated, it will be crossed over with an X mark in the Steplist. Otherwise the step is executed. The Inactivate command can be used when you want to use an old calibration curve with plates that only have samples on. For example, you create two steps, one for calibrators and the other for samples, both with different layouts. Then you run a calibration curve with the first step active and the second inactive. In the following run you inactivate the first step and measure the samples with the second step active.

2.1.5.16 Activate

Activate (Steps menu)

The user can choose whether or not to carry out a certain step. The Activate command is used if the user chooses to carry out the step. The Activate command cannot be distinguished by any specific mark(s) (compare above). The default is that the step is carried out. Only inactivated steps can be activated.

2.1.5.17 Print Current Step

Print Current Step (Steps menu)

Use the Print current step command to print the current step.

Displays the **Print** dialog box where you can select the print options and print the step.

Note: The appearance of the **Print** dialog box depends on the operating system used and the printer used.

2.1.5.18 Print All Steps

Print All Steps (Steps menu)

Automatically prints all steps. Displays the **Print** dialog box where you can select the print options and print the steps.

Note: The appearance of the **Print** dialog box depends on the operating system used and the printer used.

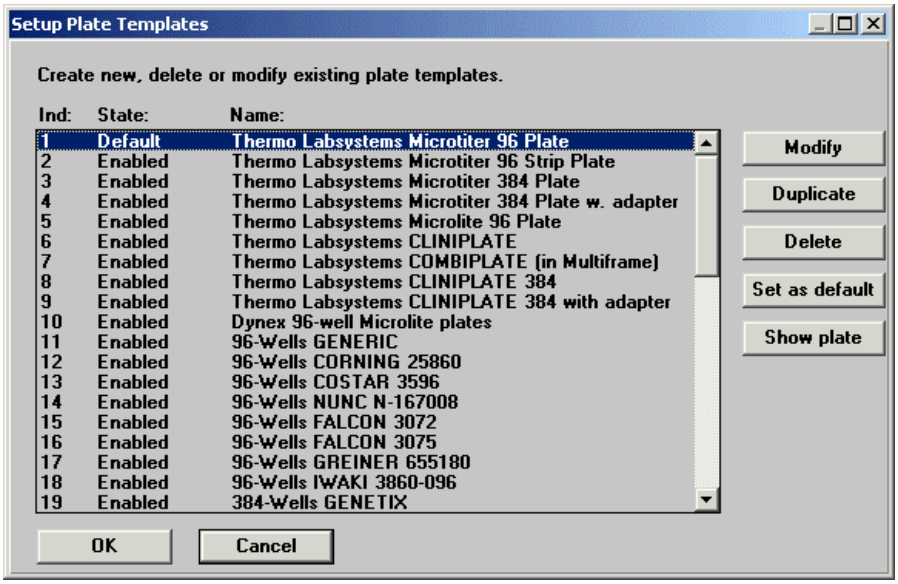
2.1.6 Setup

2.1.6.1 Plate Templates

Plate Templates (Setup menu)

Use this command to edit Plate Templates.

The Template Editor allows the user to create, delete or modify existing plate templates.


Setup Plate Templates
Create new, delete or modify existing plate templates.
Ind: State: Name:
1 Default Thermo Labsystems Microtiter 96 Plate
2 Enabled Thermo Labsystems Microtiter 96 Strip Plate
3 Enabled Thermo Labsystems Microtiter 384 Plate
4 Enabled Thermo Labsystems Microtiter 384 Plate w. adapter
5 Enabled Thermo Labsystems Microlite 96 Plate
6 Enabled Thermo Labsystems CLINIPLATE
7 Enabled Thermo Labsystems COMBIPLATE (in Multiframe)
8 Enabled Thermo Labsystems CLINIPLATE 384
9 Enabled Thermo Labsystems CLINIPLATE 384 with adapter
10 Enabled Dynex 96-well Microlite plates
11 Enabled 96-Wells GENERIC
12 Enabled 96-Wells CORNING 25860
13 Enabled 96-Wells COSTAR 3596
14 Enabled 96-Wells NUNC N-167008
15 Enabled 96-Wells FALCON 3072
16 Enabled 96-Wells FALCON 3075
17 Enabled 96-Wells GREINER 655180
18 Enabled 96-Wells IWAKI 3860-096
19 Enabled 384-Wells GENETIX
Modify
Duplicate
Delete
Set as default
Show plate
OK
Cancel

In the list box, the items marked with *Enabled* are enabled, those marked with *Disabled* are disabled and the one that is marked with *Default* is the default definition.

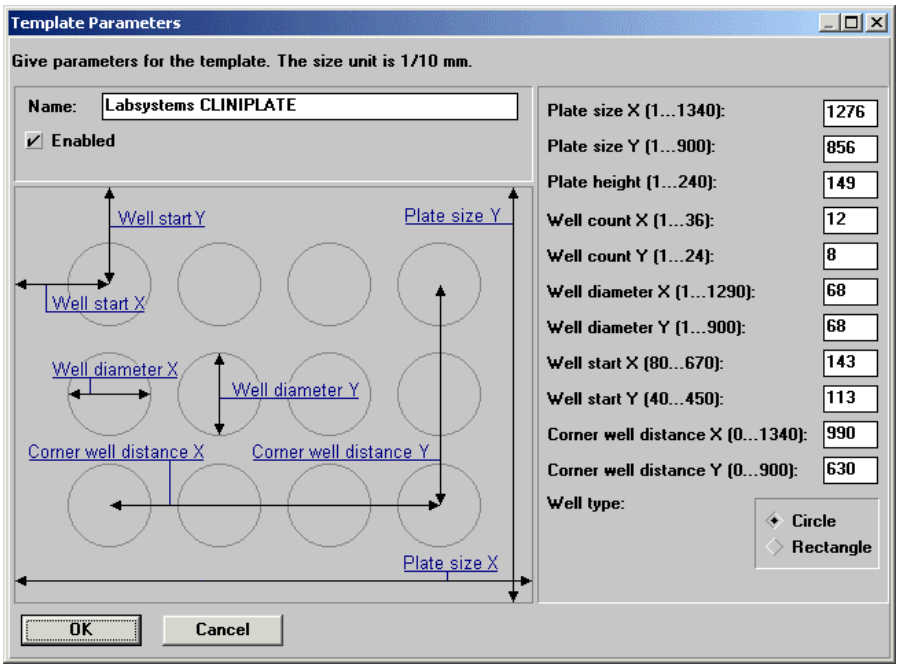
Note: If the well diameter is < 3 mm (e.g. 864-well plates), then dispensing cannot be performed since the precision of the instrument is not sufficient.

Note: Dispensing into Terasaki plates cannot be performed due to the shape of the well.

The operation buttons are:

- **Modify**. You can start to modify the selected template.
- **Duplicate**. Makes a copy of a currently selected template. You can create a new template by copying the currently selected one, modifying the template parameters and by saving it with a new name.
- **Delete.** Deletes the currently selected template after verifying that you actually want to delete the template.
- **Set as default.** Sets the currently selected template to the default template which is offered first to the user when a new Session is created.
- **Show plate.** Shows the plate layout of the currently selected template.

When you press the **Modify** template button:



Note: The size unit is 1/10 mm.

The following parameters are entered for the templates:

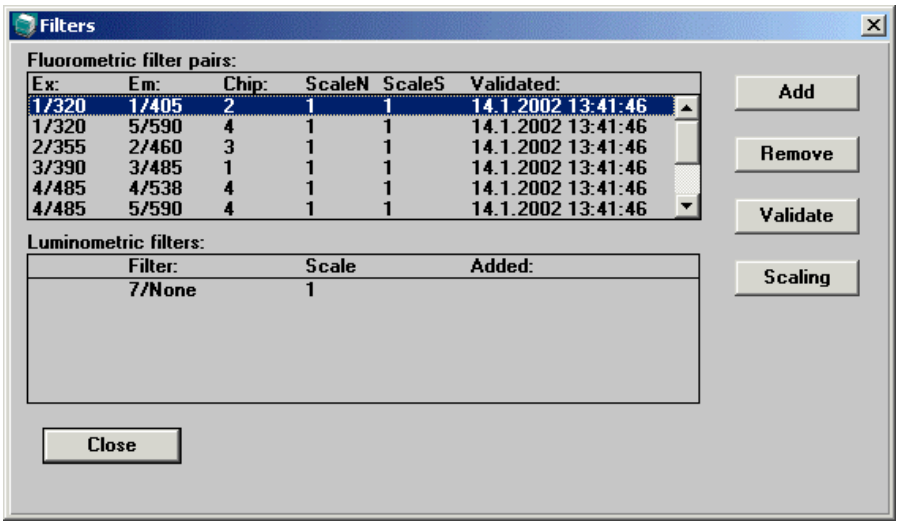
- **Name.** Define the name of the template. The name is added to the template list.
- **Enabled.** You can enable/disable templates in the template list by clicking the Enabled check box.
- **Plate size X (1...1340).** Defines the plate length in the X direction.
- **Plate size Y (1...900).** Defines the plate length in the Y direction.
- **Plate height (1...240).** Defines the plate height.
- **Well count X (1...36).** Defines the number of wells in the X direction.
- **Well count Y (1...24).** Defines the number of wells in the Y direction.
- **Well diameter X (1...1290).** Defines the well diameter in the X direction.
- **Well diameter Y (1...900).** Defines the well diameter in the Y direction.
- **Well start X (80...670).** Defines the position of the first well measured from the edge of the plate. Enter the center point of the first well in the X direction.
- **Well start Y (40...450).** Defines the position of the first well measured from the edge of the plate. Enter the center point of the first well in the Y direction.
- **Corner well distance X (0...1340).** Defines the distance between the corner wells. Enter the distance in the X direction.
- **Corner well distance Y (0...900).** Defines the distance between the corner wells. Enter the distance in the Y direction.
- **Well type. Circle** sets the shape of the wells to be circular. **Rectangle** sets the shape of the wells to be rectangular.

2.1.6.2 Filters

Filters (Setup menu)

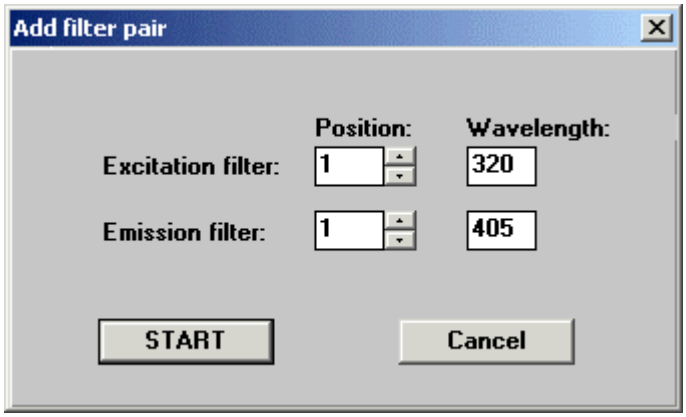
In the Filters setup menu the filter and filter pair information is modified. You can add, remove, validate, and scale filters/filter pairs. To modify luminometric filter parameters, place the cursor in the luminometric list before pressing any push buttons (Fluoroskan Ascent FL only).

In the validation procedure a new filter pair is introduced into the autocalibration system. The instrument selects the reference chip giving a suitable signal and saves the value in the memory for the autocalibration procedure. If the validation procedure does not find a suitable reference chip, the program requests if the user still wants to use this filter pair. If the answer is "Yes", the pair can be used in measurements. The instrument selects the reference channel for excitation intensity compensation in the autocalibration system. For further information, see the User Manual of the instrument used.



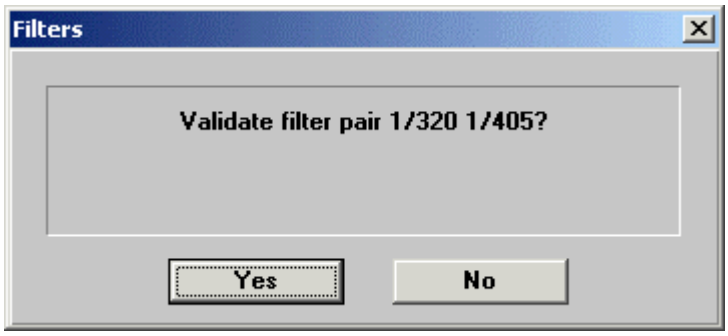
The following commands are available:

- **Add.** Defines a new fluorometric filter pair (positions and wavelengths) to be validated or a new luminometric filter (Fluoroskan Ascent FL only).

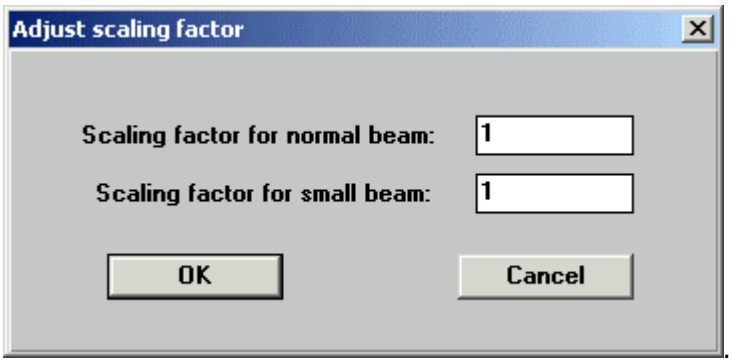


- **Remove.** The action is confirmed (Yes/No dialog) and if the user selects "Yes", an existing filter/filter pair is removed.

- **Validate.** Validates an existing filter pair (for more information, see **Filter Pair Validation**).



- **Scaling.** Sets a scaling factor.



Sets a user-defined scaling factor to the indicated filter pair (the default value is 1). The measured values are multiplied by this factor. In the fluorometric method, the scaling values can be set separately for normal and small beams.

Values of the scaling factors used in the measurement are automatically copied to the **Measure** sheet.

2.1.6.3 Password

Password (Setup menu)

Use this command to specify a system password. If a system password has been specfied, Ascent Software cannot be started without entering the password. The password length must be 5 - 10 characters long.

To set a password:

1. Select **Setup → Password**.
2. Enter a password.
3. Tick **Password in use**.
4. Click **OK**.
5. Retype password and click **OK**.

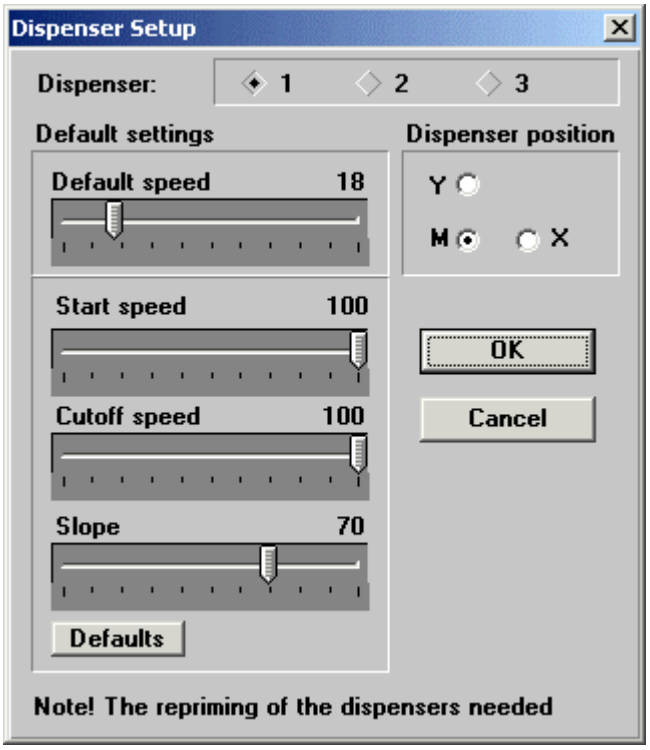
To remove a password:

1. Select **Setup → Password**.
2. Enter the password.
3. Untick **Password in use**.
4. Click **OK**.

2.1.6.4 Dispensers (not CF)

Dispensers (Setup menu)

Use this command to set the parameters for the dispensers.



- **Dispenser.** Defines the dispenser (1 to 3) to set the parameters for.
- **Dispenser position.** Defines the position of the dispenser.

2.1.6.4.1 Default settings

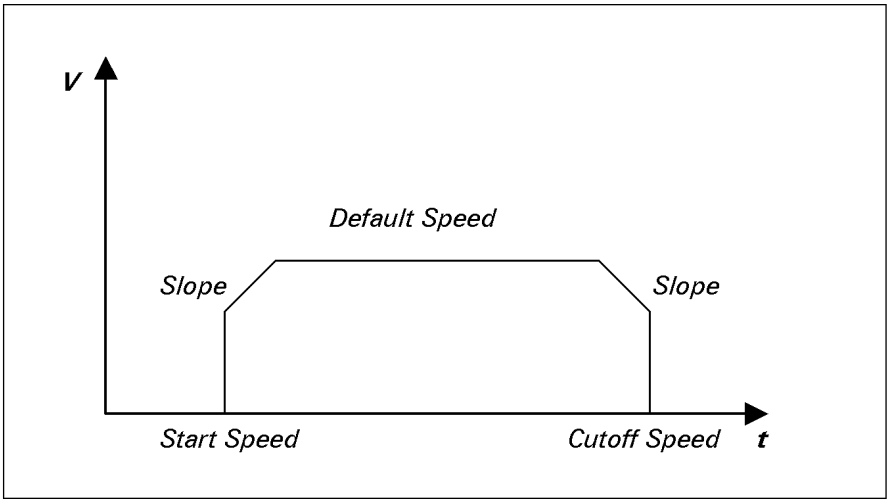
All values are a percentage of the maximum. The maximum values represent different speeds. The speeds of the dispenser pump(s) are set according e.g. to the viscosity and other properties of the liquids used.

- **Default speed.** The maximum speed of the dispenser pump syringe during the dispensing (see the following figure). The changed

Default speed is effective in the following session (**Session → New**). In certain cases, e.g. with small dispensing volumes, the **Default speed** may not be reached.

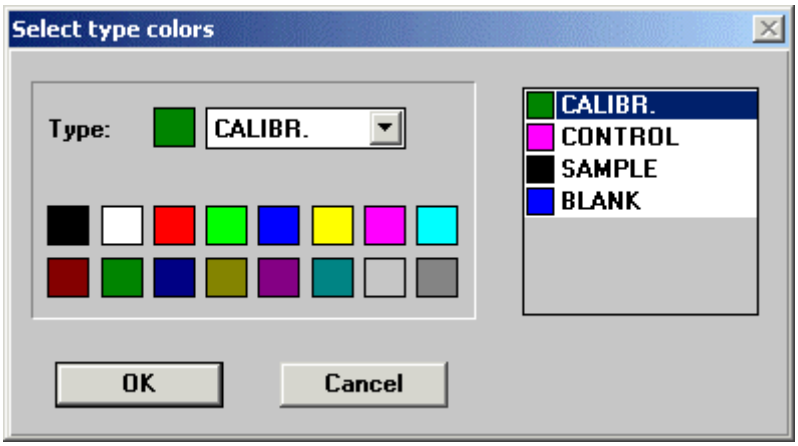
- **Start speed.** The speed with which the dispenser pump starts when the dispensing starts. The **Start speed** is effective immediately.
- **Cutoff speed.** The speed at which the dispenser pump stops completely after the dispenser pump syringe has moved the required dimension. The **Cutoff speed** is effective immediately.
- **Slope**. Both the *acceleration speed* when the pump accelerates from the **Start speed** to the **Default speed** and the *deceleration speed* when the pump decelerates from the **Default speed** to the **Cutoff speed**. The Slope is effective immediately. The Slope value can at times be slightly changed.
- **Defaults.** Reads the parameters from the initialization file and sets the factory pre-set values.

The default settings (**Default speed** 18, **Start speed** 100, **Cutoff speed** 100, and **Slope** 70) are for water-type liquids.



2.1.6.5 Colors

Colors (Setup menu)



Use this command to define the colors for the different well types (i.e. calibrators, controls, samples and blanks). The type is selected from the drop-down list and the color is selected from the palette. The selected color is displayed in the field in front of the **Type** option menu and in the list beside the name of the type.

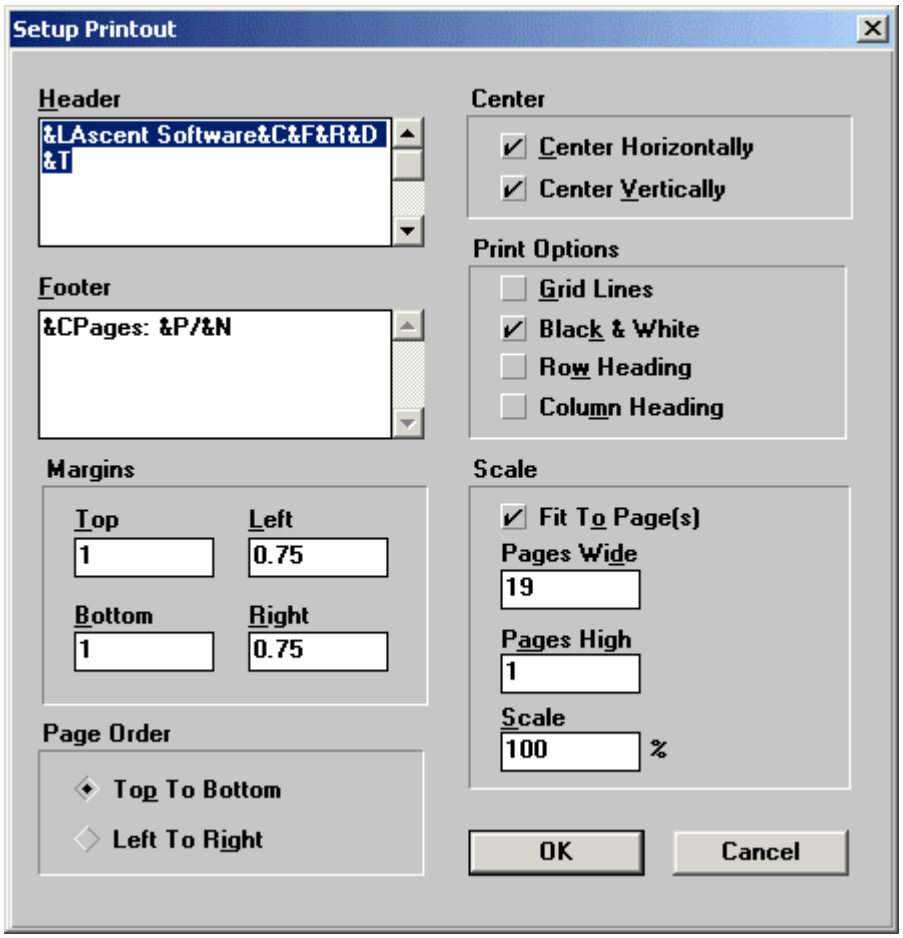
The default color for all well types is black.

The colors are used in the Layout Editor and in Results sheets. If the Layout Editor is visible when colors are changed, the previously filled wells will keep their original colors until the layout is totally updated.

Note: Light colors may not be visible in printouts

2.1.6.6 Printout

Printout (Setup menu)



The Printout command controls the headers, footers, margins and many other printout options. Headers and footers are descriptive texts, which are printed at the top and bottom of every page in your step. You can add, delete, edit, format and position headers and footers, and view them as they will be printed.

- **Header.** The area in the **Header** box shows you the contents of the header.

- **Footer.** The area in the **Footer** box shows you the contents of the footer.

  The following control characters have a special meaning:

&L	**Left alignment**
&C	**Center**
&R	**Right**
&D	**Date**
&T	**Time**
&F	**Sheet name**
&P	**Page number**
&N	**Total number of pages**

- **Margins**

  Top

  Select the distance between your data and the top edge of the printed page. The default value is 1.0 cm.

  Bottom

  Select the distance between your data and the bottom edge of the printed page. If your data is less than a page long, it will not expand to extend to the bottom margin. The default value is 1.0 cm.

  Left

  Select the distance between your data and the left edge of the printed page. The default value is 0.75 cm.

  Right

  Select the distance between your data and the right edge of the printed page. If your data is less than a page wide, it will not expand to extend to the right margin. The default value is 0.75 cm.

Note: All the margins are usually slightly over the set values due to printer properties.

- **Page Order**. Controls the order in which your data is numbered and printed when it does not fit onto one page.

  Top To Bottom

  Numbering and printing proceed from the first page to the pages below and then move to the right and continue printing down.

  Left To Right

  Numbering and printing proceed from the first page to the pages to the right and then move down and continue printing across the page.

- **Center**. Centers the data on the page within the margins vertically, horizontally or both.

- **Print Options**

  Grid Lines

  If selected, prints horizontal and vertical cell grid lines in worksheets.

  Black & White

  Prints drawing objects in black and white. Anything in the foreground that is not entirely white is printed as black. Anything in the background that is not entirely black is printed as white. If you formatted your data with colors but print on a black and white printer, select this option. If you use a color printer but want faster printing, selecting this option may reduce the printing time.

  Row and Column Headings

  Prints row numbers and column letters in the A1 reference style or numbered rows and columns in the R1C1 reference style.

- **Scale.** Reduces the step or selection during printing to fit the specified number of pages.

  Fit To Pages

  In most cases it is worthwhile to select this option to save paper.

  Pages Wide

  You can change the figure of pages wide. This figure does not normally have to be changed. The default figure is 19. Pages wide can range from 1 to 100.

  Pages High

  You can change the figure of pages high. This figure does not normally have to be changed. The default figure is 1. Pages high can range from 1 to 100.

Note: *Pages Wide* and *Pages High* are used together with *Fit To Pages* to define how many papers can maximum be used when you scale the data to the page(s). If the data requires width but not height, then Pages Wide = 19 and Pages High = 1. On the other hand, if the data requires height but not width, then Pages Wide = 1 and Pages High = 19.

Scale

Reduces or enlarges the selection to be printed. You can reduce the selection to be printed to 10% of its normal size or enlarge it up to 400%. The default value is 100%.

2.1.6.7 Instrument Status

Instrument Status (Setup menu)

Retrieves the Instrument Status report including the version, serial number and a list of instrument data. This function is enabled when the instrument is connected and is online. The user can obtain valuable information from the Instrument Status report, e.g. in problem situations. By pressing the **Save** button you can store the Instrument Status report as a text file. By pressing the **Print** button you can print the Instrument Status report. The **Print** dialog is the same as the dialog in other print functions.

Example Instrument Status report

Report created:	26.2.2002 14:09:05
Instrument:	Fluoroskan Ascent FL 2.5
Serial number:	374033609C
Instrument capabilities:	
Shaking:	Yes
Incubating:	Yes
Dispensers:	1
Current beam:	Normal
Plate X offset correction [steps]:	2
Plate Y offset correction [steps]:	1
Excitation stepper offset correction [steps]:	0
Emission stepper offset correction [steps]:	0
Temperature A/D offset correction 10 to 24°C:	-2
Temperature A/D offset correction 24 to 45°C:	-1
Measure A/D offset correction:	-3
Background noise standard deviation:	5.45
PMT gain factor:	0.714
Gain adjust factor for gain 1:	1039.28
Gain adjust factor for gain 10:	102.518
Gain adjust factor for gain 100:	10.1323
Gain adjust factor for gain 1000:	1
Lamp set voltage:	10.0 V

Heating elements:

Ceiling temperature °C:	23.8
Ceiling offset °C:	1.20
Ceiling slope C/°C:	0.10
Ceiling slope start °C:	37.00
Bottom temperature °C:	23.6
Bottom offset °C:	0.00
Bottom slope C/°C:	0.00
Bottom slope start °C:	0.00

Filter pair data:

Excitation filter position:	1
Excitation filter wavelength:	355
Emission filter position:	1
Emission filter wavelength:	460
Calibration chip:	3
Validation signal [% of max.]:	2.24
Validation background [% of max.]:	0.01
Calibration factor:	1.00227
Normal beam scaling factor:	1
Small beam scaling factor:	1
Date and time of validation:	13.2.2002 16:08:44
Reference channel gain:	47.63
PMT voltage:	550
Excitation filter position:	2
Excitation filter wavelength:	485
Emission filter position:	2
Emission filter wavelength:	518
Calibration chip:	3
Validation signal [% of max.]:	33.90
Validation background [% of max.]:	0.00
Calibration factor:	1.02704
Normal beam scaling factor:	1
Small beam scaling factor:	1
Date and time of validation:	13.2.2002 16:09:21
Reference channel gain:	7.66
PMT voltage:	423
Excitation filter position:	2

Excitation filter wavelength:	485
Emission filter position:	3
Emission filter wavelength:	538
Calibration chip:	4
Validation signal [% of max.]:	35.64
Validation background [% of max.]:	0.00
Calibration factor:	1.02316
Normal beam scaling factor:	0.338
Small beam scaling factor:	0.372
Date and time of validation:	13.2.2002 16:09:38
Reference channel gain:	7.66
PMT voltage:	433

Excitation filter position:	3
Excitation filter wavelength:	544
Emission filter position:	4
Emission filter wavelength:	590
Calibration chip:	4
Validation signal [% of max.]:	48.69
Validation background [% of max.]:	0.00
Calibration factor:	1.01719
Normal beam scaling factor:	1
Small beam scaling factor:	1
Date and time of validation:	13.2.2002 16:09:57
Reference channel gain:	4.04
PMT voltage:	442

Excitation filter position:	4
Excitation filter wavelength:	584
Emission filter position:	5
Emission filter wavelength:	612
Calibration chip:	4
Validation signal [% of max.]:	12.84
Validation background [% of max.]:	0.00
Calibration factor:	1.02343
Normal beam scaling factor:	1
Small beam scaling factor:	1
Date and time of validation:	13.2.2002 16:10:16
Reference channel gain:	3.89
PMT voltage:	456

Luminometric status:

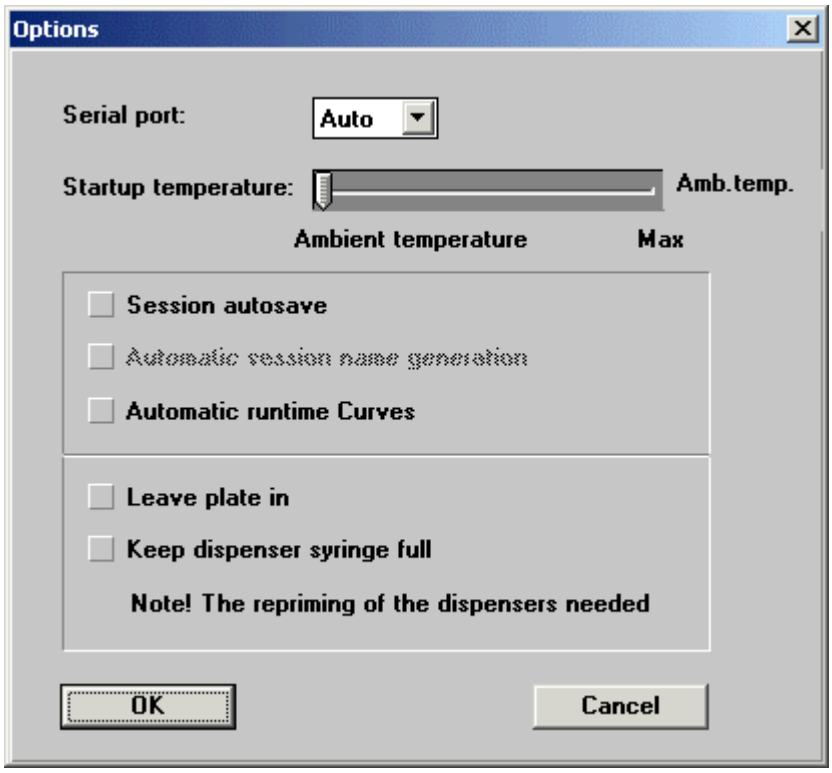
Default PMT voltage:	850

Filter data:

Filter position:	7
Filter wavelength:	0
Scaling factor:	100.988998
Date and time of adding:	26.2.2002 14:09:06

2.1.7 Options

The Options dialog allows the user to set the startup parameters: the serial port selection; startup temperature for incubation; session autosave parameters, and the dispenser control.



- **Serial port.** Searches for the instrument in the selected port (COM1...COM4) or automatically (Auto) in every port. If autosearch fails, use the port selection.
- **Startup temperature.** When the program is started, the incubation goes on.

Note: To switch the incubation off, set the temperature to ambient temperature. The temperature inside the instrument is approx. +3°C above the ambient temperature.

- **Session autosave.** If the session data is changed, the current session is saved automatically.

Note: The session is overwritten over the existing session.

- **Automatic session name generation.** Saves the whole, session-related data (***.sef** (Fluoroskan Ascent and Fluoroskan Ascent CF)/***.sec** (Fluoroskan Ascent FL), ***.vtb**, ***.vtg**, and ***.lay** files) automatically when a new run is executed. The name format is: MMddhhmm.ext, where MM is the month, dd the day, hh the hours, and mm the minutes. The extension corresponds to the data file extension (***.sef** (Fluoroskan Ascent and Fluoroskan Ascent CF)/***.sec** (Fluoroskan Ascent FL), ***.vtb**, ***.vtg**, or ***.lay**).

Note: **Automatic session name generation** is enabled only when **Session autosave** is ticked.

Note: It is useful to create and use a directory for each respective Session that uses the **Automatic session name generation**.

- **Automatic runtime Curves.** The runtime Curves dialog appears automatically when this check box is checked with the measurement types Kinetic, Dual kinetic and Monitor. The curves also disappear automatically after the run.

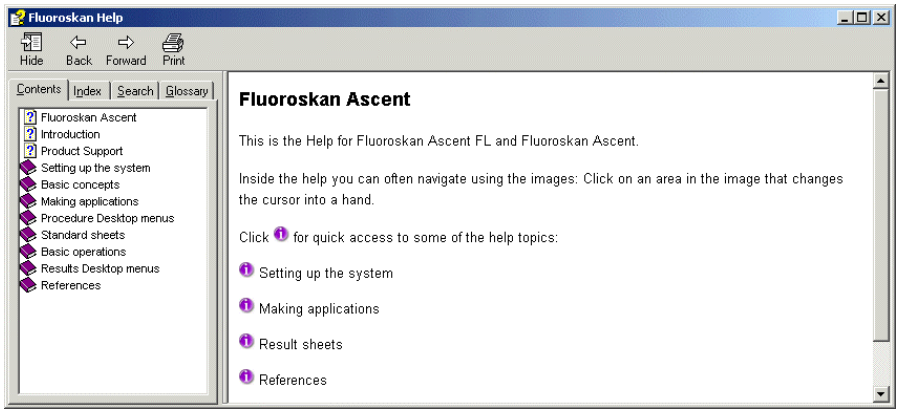
- **Leave plate in.** Leaves the plate in the instrument after a run.

- **Keep dispenser syringe full.** Aspirates the dispenser syringe full after priming and whenever the syringe needs filling always to full volume. Without this check box selected, only the volume needed for the completion of the assay will be aspirated.

2.1.8 Help

You can launch the Help application by selecting **Help** → **Help Contents** from the main menu.

The following **Help** window will appear.



The Help main menu buttons are:

- **Hide**. Hides the left-hand side navigation window. To display the navigation window again, click the **Show** button that appears instead of the **Hide** button.
- **Back**. Takes you back to the previous view in your view history.
- **Forward**. Takes you to the next view in your view history.
- **Print**. Prints a single topic or multiple topics.

You can access the help content in three different ways by selecting one of the following tabs:

- **Contents**. Browse the help topics by subject.
- **Index**. Type in a keyword or browse all keywords to find a specific topic.

- **Search**. Find a specific help topic by entering words to search in the help content.

Note: Many images in the help application contain links to topics. When you see an image, move the cursor across the image to find the links.

3 Results Desktop

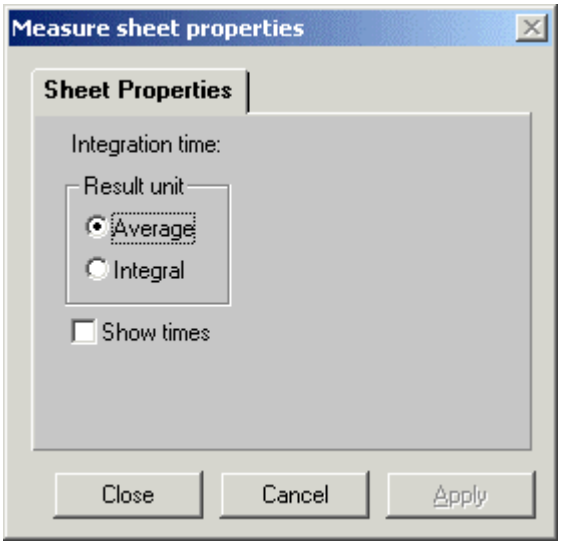
3.1 General (results)

3.1.1 Standard Sheets

3.1.1.1 Measurements

Every measurement step generates a measurement sheet automatically. The name of the sheet is the same as the measurement step name and the default measurement step name is "**Measure1**". In **Dual** and **Dual kinetic** measurements two measurement sheets are generated. The name of the first sheet is the same as the step name "**Measure1**". The other sheet name is generated from the step name by adding the ending "**_f2**". The values within this sheet are raw data values.

Note: **Measure** sheets containing raw data values are locked. In other words, they contain a locking mechanism so that the measurement results cannot be tampered with.



In the **Measure sheet properties** dialog (or **Sheet → Properties**…) the **Show times** check box can be selected. The default setting is that the check box is not ticked, i.e. the measurement times are hidden. When the **Show times** check box is ticked, however, and the **OK** button or the **Apply** button is pressed, the measurement times will be shown to the right of the raw measurement data in the same **Measure** sheet in the same format. The measurement times are expressed in seconds.

The **Measure sheet properties** dialog also contains a selection for the raw data result unit. **Average** (default setting) sets the result unit to be either RFU/s (fluorometry) or RLU/s (luminometry).

When **Average** is selected, all results are calculated per second and the result value is independent of the integration time. Therefore, the same sample will give the same numerical value with all possible integration times.

When **Integral** is selected, the calculated value is an integral over the defined integration time. This numerical value is dependent of the integration time, so that when the integration time increases, the value will increase correspondingly.

3.1.1.2 Curves

Measure1 runtime Curves are automatically created if **Create Kinetic Curves-sheet** is selected in the **Measure** step with the measurement types Kinetic, Dual kinetic and Monitor. See the **Procedure Desktop** part of the manual for more details.

The **Curves** sheet contains a constant picture of the runtime kinetic curves and the picture cannot be edited afterwards. More flexible pictures can, however, be created with **Process → Organize…** and **Process → Graph** features, see pp. 3-47 and 3-46 .

3.1.1.3 Steps

This sheet is updated automatically when a measurement is carried out. This sheet has all the step parameters defined on the **Procedure Desktop**. The summary of the plate layout can also be found here.

3.1.1.4 RunStatus

This sheet is updated automatically when a measurement is carried out. This sheet provides general information about the last run, such as the session name, program versions and information about possible warnings and errors during the measurement. See the **Procedure Desktop** part of the manual for more details.

3.1.2 Basic operations

3.1.2.1 Sheet names

Sheets created with the **Process** menu are named automatically. However, sheet names can be changed using the **Sheet → Rename** selection.

3.1.2.2 Sheet types and properties

There are several types of sheets that have different kinds of functions. The standard sheet types are: general, measurement, multipoint, blank subtraction, precalculation, organize, kinetic processors, ratio/inhibition,

curve fit, and cut-off. The general sheets are created by the user (**Sheet → New**). Other sheet types are described in the **Process** menu section.

Every sheet (except **Steps**, **RunStatus**, **Curves** and general) has properties which can be changed in the **Properties** dialog. Each sheet type has its own type of properties.

Note: Many sheet properties utilize the area definition and plate layout. To properly update the existing results sheets, the area definition and the plate layout should match. If there is a mismatch, you might get extra results.

3.1.2.3 Linking sheets

Sheets are linked together automatically in different ways depending on the sessions. New sheets are progressively generated and linked, for example, in the following manner:

Measure1 sheet ⇒	Blank Subtraction sheet ⇒ ⇒	Curve Fit sheet
As Source Sheet 1	If blank wells are used and the Measure1 sheet acts as the source sheet.	Finally produced using the Blank Subtraction sheet as the source sheet.

3.1.2.4 Enable/Disable values

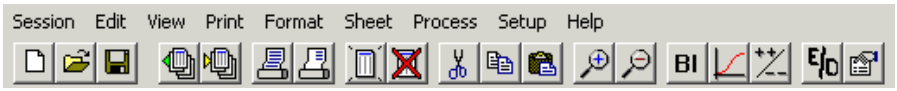
In case of erroneous measurements, values can be disabled. With regard to replicates, as well as blanks, standards and samples, it is possible to disable e.g. one value out of five different measurement values and calculate the results based on these four remaining measurement values. On the other hand, when a value is enabled, it is used in calculations.

Note: The E/D (Enable/Disable) icon is present on the results tool bar and specifies a general property employed in, for example, Cut-Off and Curve Fit sheets.

3.2 Menus (results)

3.2.1 General

Results menu and tool bar



Commands are grouped in menus. Some commands carry out an action immediately, others display a dialog box for selecting options.

You can quickly select the most commonly used commands by clicking the tool bar button with the mouse.

Some menus cannot be used in all situations.

Format menu items; **Border**, **Font**, **Number**, **Alignment**, and **Cell References** are active in user-defined sheets, which can be generated after **Sheet → New** and **Advanced Copy** sheet operations.

Format and **Edit** are active in the above-mentioned sheets.

Menu layout

Session	**Edit**		**View**
New...	Cut	Ctrl+X	Desktop Bar
Open...	Copy	Ctrl+C	Status Bar
Save	Paste	Ctrl+V	Tool Bar
Save As...	Paste Values		Tabs Bar On Top
Print...	Clear	Del	Hide/Show Sheets...
Exit	Insert	Ctrl+I	Arrange Sheets...
	Remove	Ctrl+R	Zoom In
	Cell Names	Ctrl+E	Zoom Out
	Find and Replace	Ctrl+H	Procedure
	Go To Cell		Results
	Enable/Disable		

Print		**Format**	**Sheet**
Add Page Break		Border	New Sheet...
Add Col Page Break		Font	Open Sheet...
Add Row Page Break	Ctrl+Enter	Number	Save Sheet
Remove Page Break	Ctrl+M	Alignment	Save Sheet As...
Page Setup		Cell References	Advanced Copy
Set Print Area			Delete Sheet
Print Area			Rename Sheet
Print Setup			Properties...
Print			

Process	**Setup**	**Help**
Function…	Number…	Help Contents
Graph		About
Organize…		
Multipoint…		
Blank Subtraction…		
Precalculation…		
Kinetic Processors…		
Ratio/Inhibition…		
Curve Fit…		
Cut-Off…		

3.2.2 Session

See the **Procedure Desktop** for more details.

3.2.2.1 New...

New... (Session menu) or

Use this command to create a new session and specify the name of the session.

3.2.2.2 Open ...

Open ... (Session menu) or

Use this command to open an existing session.

3.2.2.3 Save

Save (Session menu) or

Use this command to save the session.

3.2.2.4 Save As ...

Save As ... (Session menu)

Use this command to save the session with a new name.

3.2.2.5 Print ...

Print ... (Session menu) or

Use this command to get a printout of the session.

3.2.2.6 Last five sessions

The last five sessions can be quickly opened from the list.

3.2.2.7 Exit

Exit (Session menu)

Use this command to exit the program.

3.2.3 Edit

3.2.3.1 Cut

Cut (Edit menu) or

Removes the selection from the sheet and places it on the Clipboard. The selection can be a cell or a cell range.

When you cut characters in a cell, the characters are removed to the Clipboard. The cut characters are then available for pasting into a new location.

Shortcut: Ctrl+X

3.2.3.2 Copy

Copy (Edit menu) or

Copies the selection to the Clipboard. The selection can be a cell or a cell range.

When you copy characters in a cell, the characters are placed on the Clipboard. The copied characters are then available for pasting into a new location.

Shortcut: Ctrl+C

3.2.3.3 Paste

Paste (Edit menu) or

Pastes the contents of the Clipboard into the selected location.

Shortcut: Ctrl+V

3.2.3.4 Paste Values

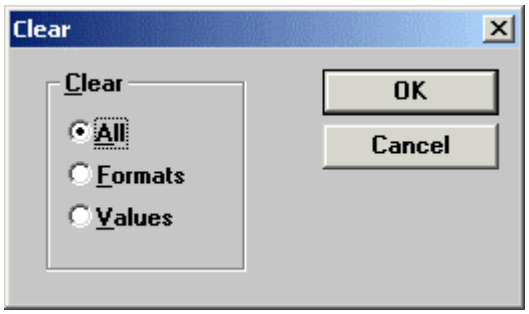
Paste Values (Edit menu)

Pastes values only from the Clipboard into the selected location.

Shortcut: none

3.2.3.5 Clear

Clear (Edit menu)



Clears the selected area (**All**, **Formats** or **Values**). **Formats** clears the calculation formula, **Values** clears the numerical values, and **All** clears both the calculation formula and the numerical values.

Shortcut: Del

3.2.3.6 Insert

Insert (Edit menu)

Inserts a row or range of blank cells equivalent in size and shape into the selected cell range. The selected rows or cells are shifted to accommodate the insertion.

Shortcut: Ctrl+I

3.2.3.7 Remove

Remove (Edit menu)

The Remove command completely removes selected cells, rows or columns from a worksheet. The surrounding cells shift to fill the space.

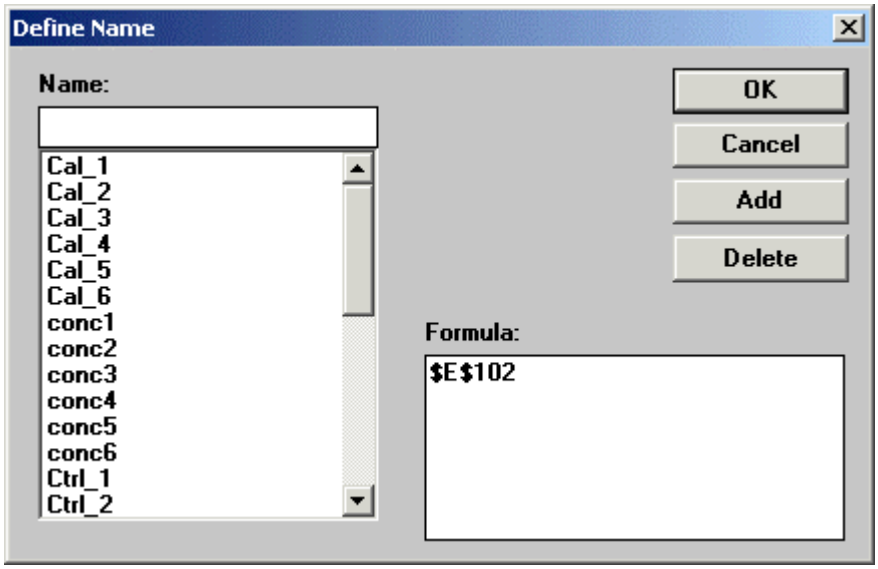
Shortcut: Ctrl+R

Note: The **Insert** and **Remove** commands should be used with care since their use might interfere with formulas or graphs.

3.2.3.8 Cell Names

Cell Names (Edit menu)

Use this command to edit names.



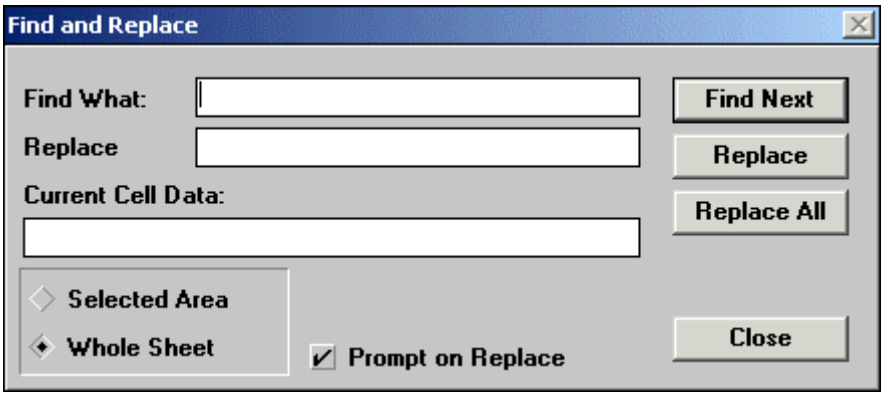
- **Name.** Creates a name for a cell, range, constant or computed value. You can then use this name to refer to the cell, range or value. Names make formulas easier to read, understand and maintain. You can add or delete names that have been defined previously.
- **Formula.** You can define constant or computed values you intend to use later.

Shortcut: Ctrl+E

3.2.3.9 Find and Replace

Find and Replace (Edit menu)

Searches a selected area or the entire (whole) worksheet for specified characters, selects the first cell containing these characters and replaces them.



The operation buttons are:

- **Find What**. Specifies what to search for.
- **Replace.** Identifies the characters that will replace the characters searched for.
- **Current Cell Data.** Displays the searched data and cell position.
- **Replace.** Replaces the searched characters in the active cell with the new characters.
- **Replace All.** Finds and Replaces every occurrence of the characters in the **Find What** text box with the characters in the **Replace** text box.
- **Selected Area.** Finds and Replaces in the selected area.
- **Whole Sheet.** Finds and Replaces in the whole sheet.
- **Prompt on Replace.** Asks to confirm the replacement.

Shortcut: Ctrl+H

3.2.3.10 Go To Cell

Go To Cell (Edit menu)

Use this command to go to a given worksheet address. The Go To command can occasionally be seen in the Goto (GOTO) format.

Goes to the specified cell.

3.2.3.11 Enable/Disable

Enable/Disable (Edit menu) or

Enables or disables the value in a selected cell. Enable/Disable (E/D) only affects the current sheet and the property is not inherited to other processed sheets (exception: disabling of Blank in blank subtraction sheet and measurement values in Measure sheets containing more than one measurement point per well). In case of erroneous measurements, values can be disabled. With regard to replicates, as well as blanks, standards and samples, it is possible to disable e.g. one value out of five measurement values and calculate the results based on these four remaining values. On the other hand, when a value is enabled, it is used in calculations. Enable/Disable specifies a general property employed in, for example, Cut-Off and Curve Fit sheets.

In a **Blank Subtraction** sheet you can Enable/Disable "BLANK" well values. It is effective in Blank Subtraction calculations. In a **Curve Fit** sheet you can Enable/Disable calibrator values and values in the **Result** list. In the **Cut-Off** sheet you can Enable/Disable control values and calculated values in the **Result** list.

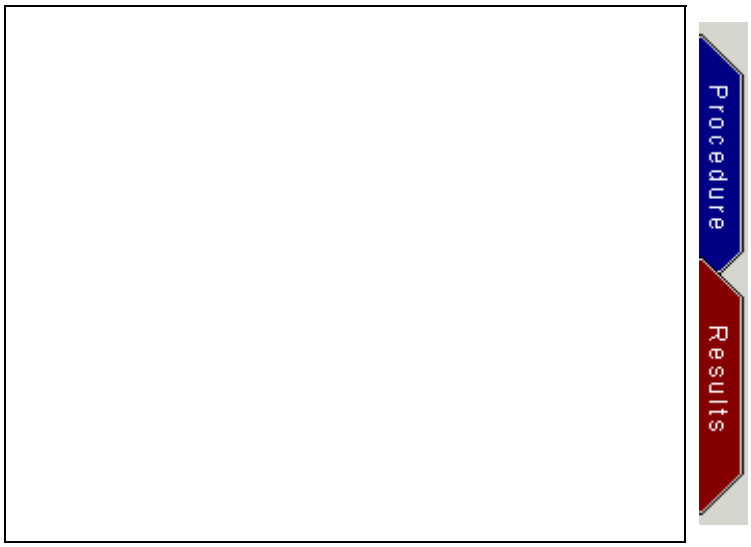
The Enable/Disable command is not active in Measure sheets containing only one measurement point per well.

3.2.4 View

3.2.4.1 Desktop Bar

Desktop Bar (View menu)

The Desktop tabviews are located to the right of the active desktop. The Desktop tabview selects the active desktop for the program. When the desktop is changed, the menus and tool bars also change.



Use this command to view the Desktop Bar.

3.2.4.2 Status Bar

Status Bar (View menu)

When a command is selected, the left side of the status bar briefly describes the command. Normally the status bar shows the line state of the instrument, the beam size, selected temperature and the current time.

Instrument status bar:

Note: The status bar at the bottom of the screen also displays information about a selected command.

Message status bar:

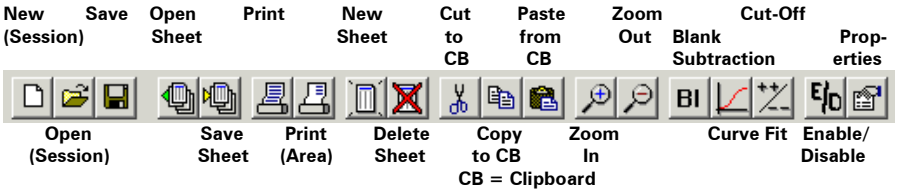
Use the **Status Bar** command in the **View** menu to display or hide the status bar.

3.2.4.3 Tool Bar

Tool Bar (View menu)

Along the top of the Desktop window, you can see a horizontal strip containing several tools - this is the tool bar. It offers the most commonly used functions from the menu as tool buttons. Although these buttons perform the same functions as their menu counterparts, they are more convenient to use.

Results tool bar:



Use the **Tool Bar** command in the **View** menu to display or to hide the tool bar.

3.2.4.4 Tabs Bar

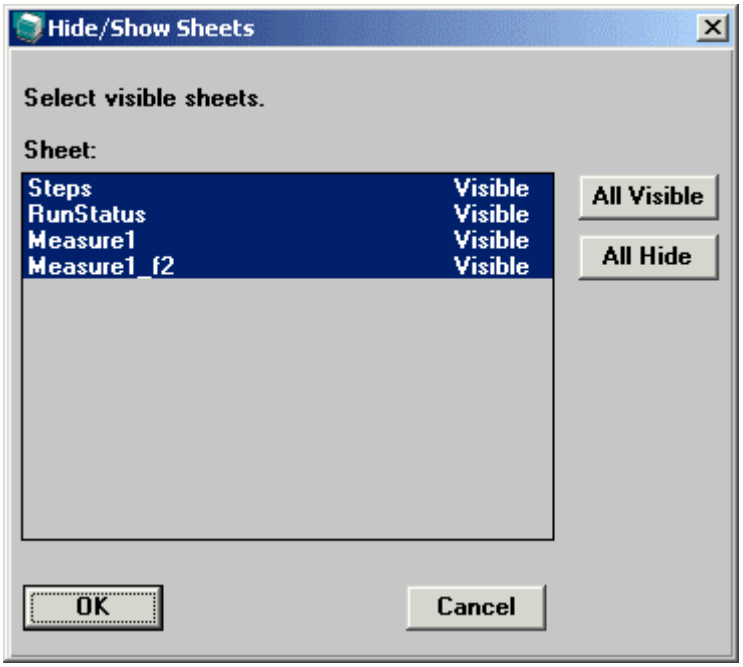
Tabs Bar On Top (View menu)

Use this command to display the Tabs Bar either on top of the view or at the bottom of the view.

3.2.4.5 Hide/Show Sheets...

Hide/Show Sheets... (View menu)

Use this command to select visible sheets. The sheets vary according to the application employed.



- **Sheet.** Contains the list of existing sheets.

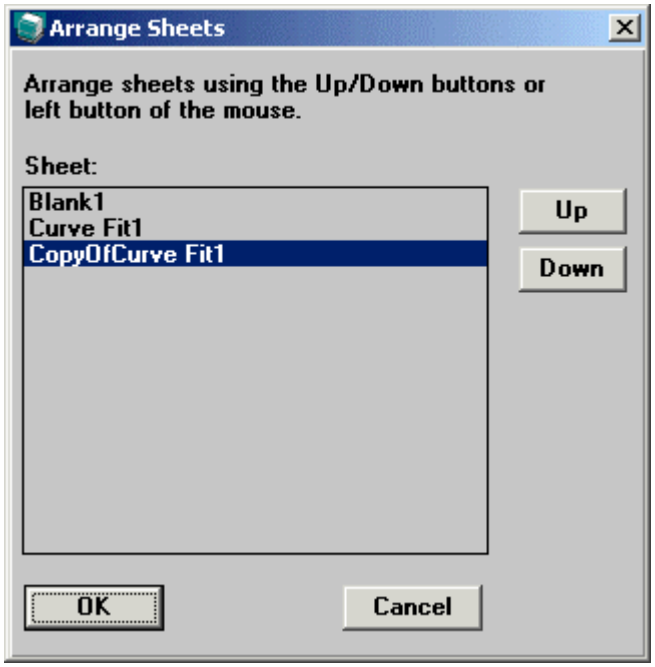
- **All Visible.** Select if you want all sheets to be visible.
- **All Hide.** Select if you want all sheets to be hidden.

Note: Only selected sheets are visible.

3.2.4.6 Arrange Sheets...

Arrange Sheets... (View menu)

Use this command to arrange active sheets. You can change the order of the sheets by pressing the left mouse button and dragging the list item into a suitable position. You can also change the order of the sheets with the **Up** and **Down** buttons.



- **Sheet.** Contains the list of existing sheets.
- **Up.** Moves the selected sheet one step up.
- **Down.** Moves the selected sheet one step down.

3.2.4.7 Zoom In

Zoom In (Format menu) or

Zooms in the display at 10% intervals.

3.2.4.8 Zoom Out

Zoom Out (Format menu) or

Zooms out the display at 10% intervals.

3.2.4.9 Procedure

Procedure (View menu)

Use this command to view the **Procedure Desktop**. Return to the **Results Desktop** through the **Results → View** command or by pressing the **Results Desktop** bar.

3.2.4.10 Results

Results (View menu)

Use this command to view the **Results Desktop**. Return to the **Procedure Desktop** through the **Procedure → View** command or by pressing the **Procedure Desktop** bar.

3.2.5 Print

3.2.5.1 Add Page Break

Add Page Break (Print menu)

Adds vertical and horizontal page breaks adjacent to the current cell.

3.2.5.2 Add Col Page Break

Add Col Page Break (Print menu)

Adds a vertical page break adjacent to the current cell.

3.2.5.3 Add Row Page Break

Add Row Page Break (Print menu)

Adds a horizontal page break adjacent to the current cell.

Shortcut: Ctrl+Enter

3.2.5.4 Remove Page Break

Remove Page Break (Print menu)

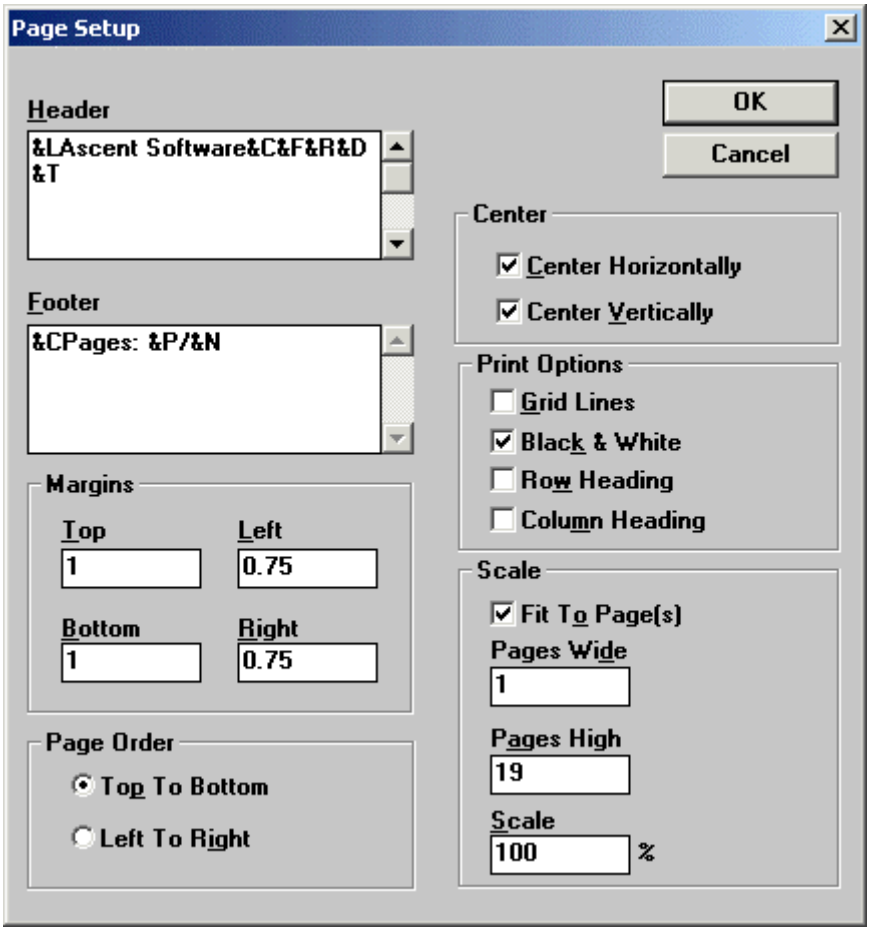
Removes vertical and horizontal page breaks adjacent to the current cell.

Shortcut: Ctrl+M

3.2.5.5 Page Setup

Page Setup (Print menu)

Use this command to set the page setup.



Controls the headers, footers, margins and many other options for the selected worksheet. Headers and footers are descriptive texts, which are printed at the top and bottom of every page in your sheet. You can add, delete, edit, format and position headers and footers, and view them as they will be printed.

The values given separately for every sheet (including the **Measure1**, **Steps**, **RunStatus** and **Measure1 Curves** sheets) are stored from run to run. The scale does not keep its value, but is always changed to 100 in a run. When the order of the steps is changed and the session has been

stored and opened, the values for the aforementioned sheets are initialized to the values set by **Procedure Desktop**: **Setup → Printout**.

- **Header.** The area in the **Header** box shows you the contents of the header.
- **Footer.** The area in the **Footer** box shows you the contents of the footer.

The following control characters have a special meaning:

&L	**Left alignment**
&C	**Center**
&R	**Right**
&D	**Date**
&T	**Time**
&F	**Sheet name**
&P	**Page number**
&N	**Total number of pages**

- **Margins**

  Top

  Select the distance you want between your data and the top edge of the printed page. The default value is 1 cm.

  Bottom

  Select the distance you want between your data and the bottom edge of the printed page. If your data is less than a page long, it will not expand to extend to the bottom margin. The default value is 1 cm.

  Left

  Select the distance you want between your data and the left edge of the printed page. The default value is 0.75 cm.

Right

Select the distance you want between your data and the right edge of the printed page. If your data is less than a page wide, it will not expand to extend to the right margin. The default value is 0.75 cm.

Note: All the margins are usually slightly over the set values due to printer properties.

- **Page Order.** Controls the order in which your data is numbered and printed when it does not fit onto one page.

  Top To Bottom

  Numbering and printing proceed from the first page to the pages below and then move to the right and continue printing down the sheet.

  Left To Right

  Numbering and printing proceed from the first page to the pages to the right and then move down and continue printing across the sheet.

- **Center.** Centers the data on the page within the margins vertically, horizontally or both.

- **Print Options**

  Grid Lines

  If selected, prints horizontal and vertical cell grid lines in worksheets.

  Black & White

  Prints cells and drawing objects in black and white. Anything in the foreground that is not entirely white is printed black. Anything in the background that is not entirely black is printed white. If you formatted your data with colors but print on a black and white printer, select this option. If you use a color printer but want faster printing, selecting this option may reduce the printing time.

Row and Column Headings

Prints row numbers and column letters in the A1 reference style or numbered rows and columns in the R1C1 reference style.

- **Scale.** Reduces the sheet or selection during printing to fit onto the specified number of pages.

  Fit To Page(s)

  In most cases it is worthwhile to select this option to save paper.

  Pages Wide

  You can change the figure of pages wide. This figure does not normally have to be changed. The default figure is 1. Pages wide can range from 1 to 100.

  Pages High

  You can change the figure of pages high. This figure does not normally have to be changed. The default figure is 19. Pages high can range from 1 to 100.

Note: *Pages Wide* and *Pages High* are used together with *Fit To Pages* to define how many papers can maximum be used when you scale the data to the page(s). If the data requires width but not height, then Pages Wide = 19 and Pages High = 1. On the other hand, if the data requires height but not width, then Pages Wide = 1 and Pages High = 19.

Scale

Reduces or enlarges the printed sheet. You can reduce the printed sheet to 10% of its normal size or enlarge it up to 400%. The default value is 100%.

3.2.5.6 Set Print Area

Set Print Area (Print menu)

Use this command to set the print area.

Defines the selected cells as the portion of the worksheet that you want to print.

The print area given separately for every sheet (including the **Measure1**, **Steps**, **RunStatus** and **Measure1 Curves** sheets) is stored from run to run.

3.2.5.7 Print Area

Print Area (Print menu) or

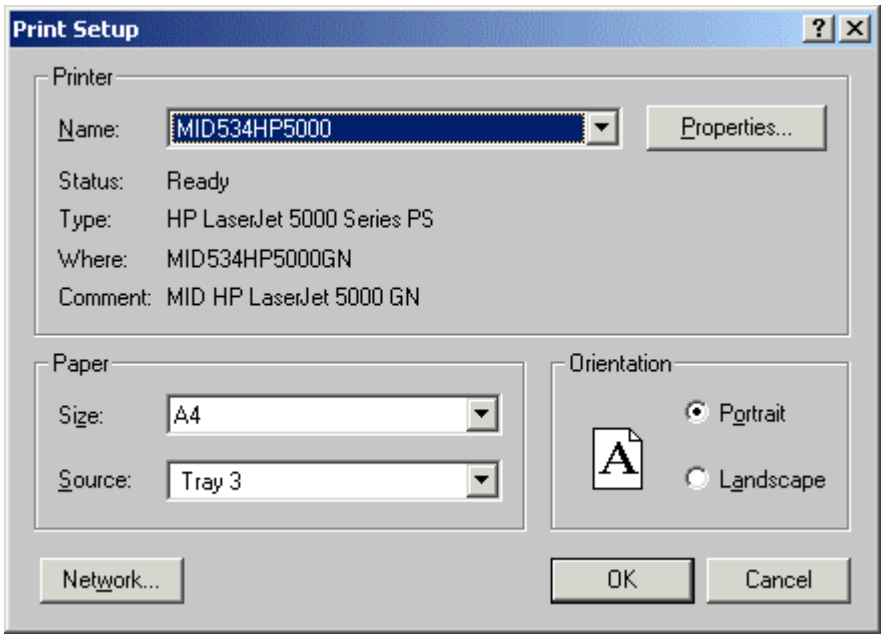
Use this command to print the currently selected area. Select the area by using the mouse.

3.2.5.8 Print Setup

Print Setup (Print menu)

Use this command to set the print setup.

Note: The layout of this dialog depends on the Windows version.



Controls the printer selection, page orientation and the paper size and source.

- **Options/Properties.** The contents of this dialog box depends on the Windows version and the printer employed. Use this dialog box to specify the option properties, e.g. the darkness and fineness of the graphics and text, and whether or not to convert TrueType fonts to graphics when printing.
- **Paper**

Size

Select A4, letter, legal or some other paper size option.

Source

You can specify which paper feeder to use.

- **Orientation.** Specify the orientation for the printed image.

  Portrait

  Prints with the short edge of the paper horizontal.

  Landscape

  Prints with the long edge of the paper horizontal.

- **Network...** . The contents of this dialog box depends on the Windows version and the printer employed. Use this dialog box to browse through and connect to a network printer. To connect to a network printer (Capture Printer Port), you assign a port (virtual port) to the printer (device) and you specify the path (computer name and share name). The share name equals the network name and is e.g. the name under the icon of a shared printer. You can also choose whether or not to reconnect at logon.

3.2.5.9 Print

Print (Print menu) or

Use this command to print the current sheet.

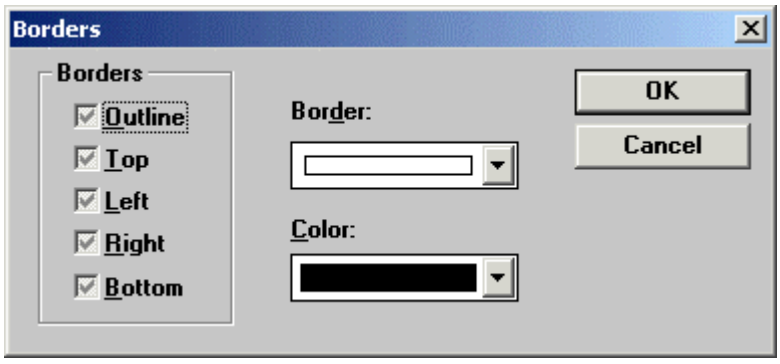
Note: The layout of this dialog depends on the printer used.

3.2.6 Format

3.2.6.1 Border

Border (Format menu)

Use the Format/Border command to add or remove border lines in the selected cells.



- **Borders**. Click the check box(es) to select or deselect.

  Outline

  Puts a border around the outer edges of the selection.

  Top, Left, Right, Bottom

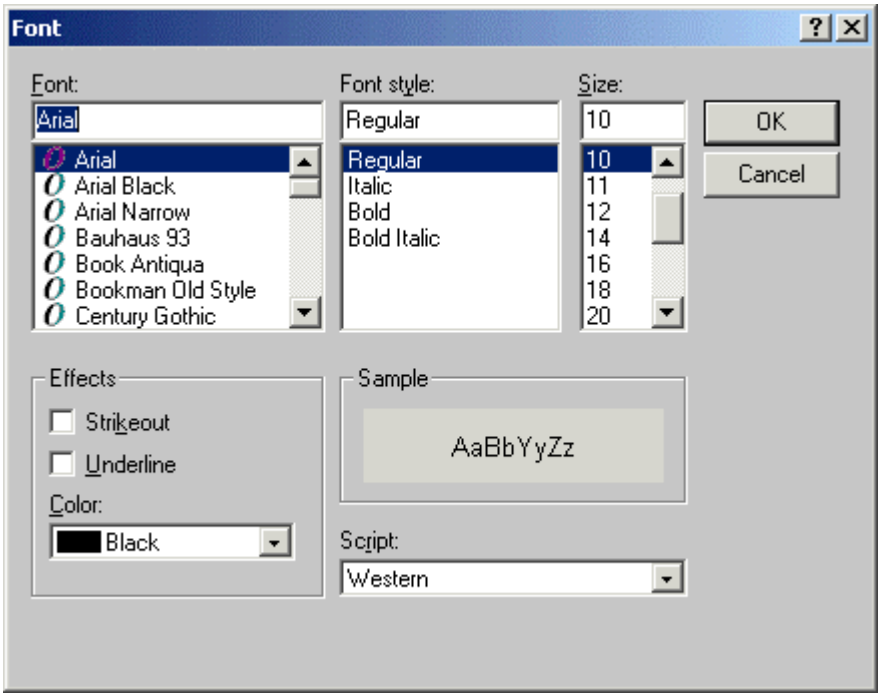
  Puts a border along the specified edges of each cell in the selection.

- **Border**. Sets the line style to apply to a border.
- **Color**. Sets the border color.

3.2.6.2 Font

Font (Format menu)

Use this command to change the font, style, size, color and effects (strikeout, underline) of the text in the selected cells.



- **Font.** Lists all available font types. Select the font you want or enter the name of the font in the box above the list of font types.
- **Font style.** Lists the available font styles. Select the font style you want or enter the font style in the box above the list of font styles.
- **Size.** Lists the available sizes for the font selected in the **Font** box. Select a font size or enter the size you want in the box above the list of sizes.

- **Effects**

  Strikeout

  Formats selected characters with a line through the middle.

Note: E/D (**Enable**/**Disable**) visibly looks about the same as strikeout.

  Underline

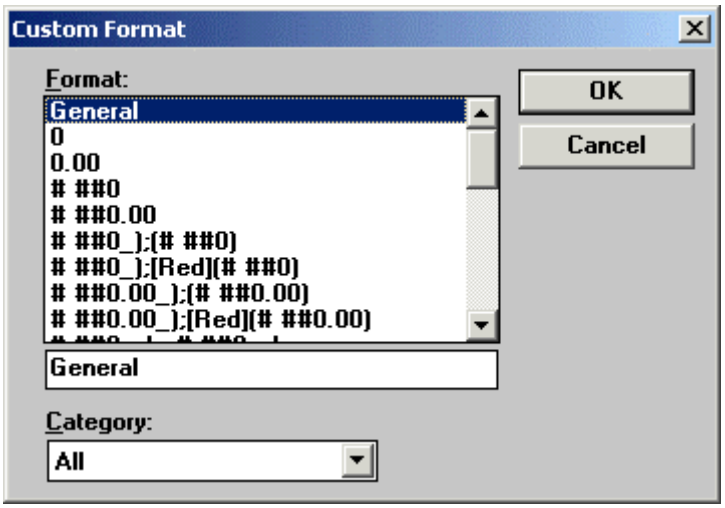
  Underlines the selected characters.

- **Color.** Lists the available colors. Select a color for the text from the drop-down list.
- **Sample.** Shows a sample of the text with the current font formatting choices applied.
- **Script.** Lists the available scripts (set of letters). Select a script from the drop-down list.

3.2.6.3 Number

Number (Format menu)

Use this command to determine how the information is displayed in the selected cells. You can use one of the built-in number formats or you can create your own custom formats.

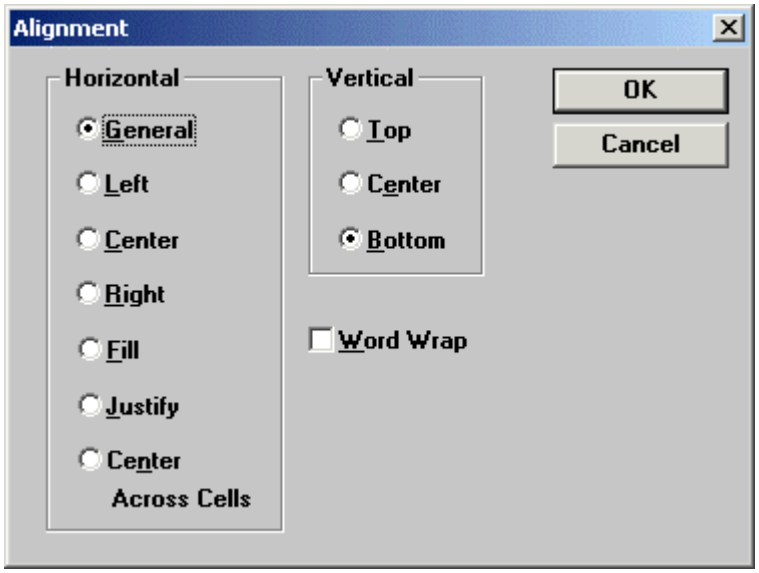


- **Format**. Lists all available formats for a selected category. In a new worksheet, the default number format for all cells is the *General* format. The selected format is displayed below the **Format** list box.
- **Category**. Lists the categories into which the number formats are grouped into. When you select a category, the built-in and custom formats for that category are displayed in the **Format** list box.

3.2.6.4 Alignment

Alignment (Format menu)

Aligns the contents of the selected cells.



- **Horizontal**

  General

  Aligns text to the left, numbers to the right and centers logical and error values. This is the default alignment.

  Left

  Aligns the cell contents to the left.

  Center

  Centers the cell contents.

Right

Aligns the cell contents to the right.

Fill

Repeats the contents of the selected cell until the cell is full. If the blank cells to the right also have the *Fill* alignment, they are filled as well.

Justify

Aligns wrapped text (see the **Word Wrap** paragraph below) within a cell to the right and left. You must have more than one line of wrapped text to see the justification.

Center Across Cells

Centers a cell entry across the selected cells.

- **Vertical**

  Top

  Aligns the cell contents along the top of the cell.

  Center

  Centers the cell contents to the middle of the cell.

  Bottom

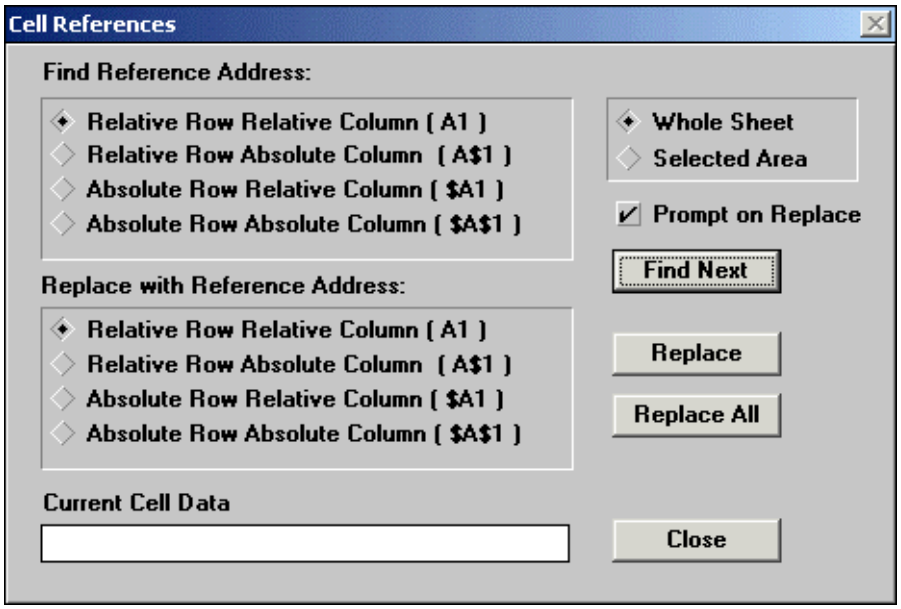
  Aligns the cell contents along the bottom of the cell.

- **Word Wrap**. Also known as *wraparound.* Displays long strings of text on multiple lines within a cell. Wrapped text may be left-aligned, right-aligned, centered or justified in a cell.

3.2.6.5 Cell References

Cell References (Format menu)

Searches the selected area or the entire worksheet for a specified (Find) reference address and replaces it with the **Replace with Reference Address** type.


Cell References
Find Reference Address:
Relative Row Relative Column (A1)
Relative Row Absolute Column (A$1)
Absolute Row Relative Column ($A1)
Absolute Row Absolute Column (A1)
Whole Sheet
Selected Area
Prompt on Replace
Find Next
Replace with Reference Address:
Relative Row Relative Column (A1)
Relative Row Absolute Column (A$1)
Absolute Row Relative Column ($A1)
Absolute Row Absolute Column (A1)
Replace
Replace All
Current Cell Data
Close

The operation buttons are:

- **Find Reference Address.** Specifies what kind of reference address to search for.
- **Replace with Reference Address.** Identifies the address type that will replace the address searched for.
- **Current Cell Data.** Specifies the contents of the active cell.
- **Whole Sheet**. Finds and Replaces in the whole sheet.
- **Selected Area**. Finds and Replaces in the selected area.
- **Prompt on Replace**. Asks to confirm the replacement.
- **Find Next**. Finds the next reference address to be replaced.

- **Replace**. Replaces the searched address type in the active cell with the new address type.
- **Replace All**. Finds and Replaces every occurrence.

3.2.7 Sheet

3.2.7.1 New Sheet...

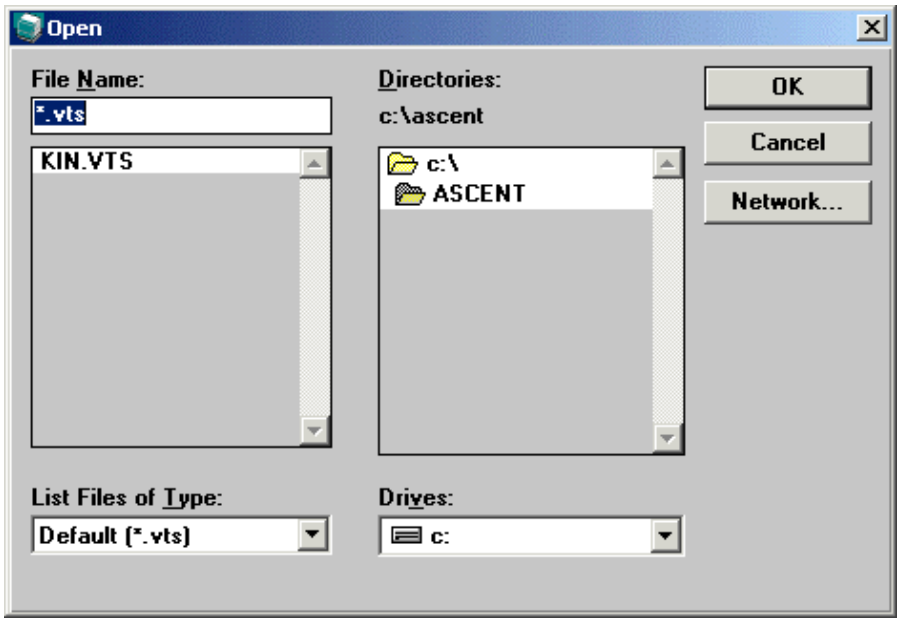
New Sheet... (Sheet menu) or

Use this command to create a new worksheet and specify the name of the sheet.

3.2.7.2 Open Sheet...

Open Sheet... (Sheet menu) or

Use this command to open an existing sheet.



Displays the **Open** dialog box where you can open an existing file. You can have several worksheets open simultaneously, but you view them individually.

- **File Name.** Displays the default file specification ***.VTS** and a list of the ***.VTS** files in the current directory. Type or select the filename you want to open. This list box lists the files with the extension you select from the **List Files of Type** list box.
- **Directories.** Lists the current directory and any subdirectories which contain files. Double-click the directories and subdirectories to move through the list.
- **List Files of Type.** Lists the available file formats. Select the file format you want to open.

- **Drives.** Lists the available drives. Select the drive that contains the worksheet you want to open.
- **Network...** . Displays a dialog box of available network servers so you can connect to a different server when your system is running on the supported network.

3.2.7.3 Save Sheet

Save Sheet (Sheet menu) or

Use this command to save the sheet.

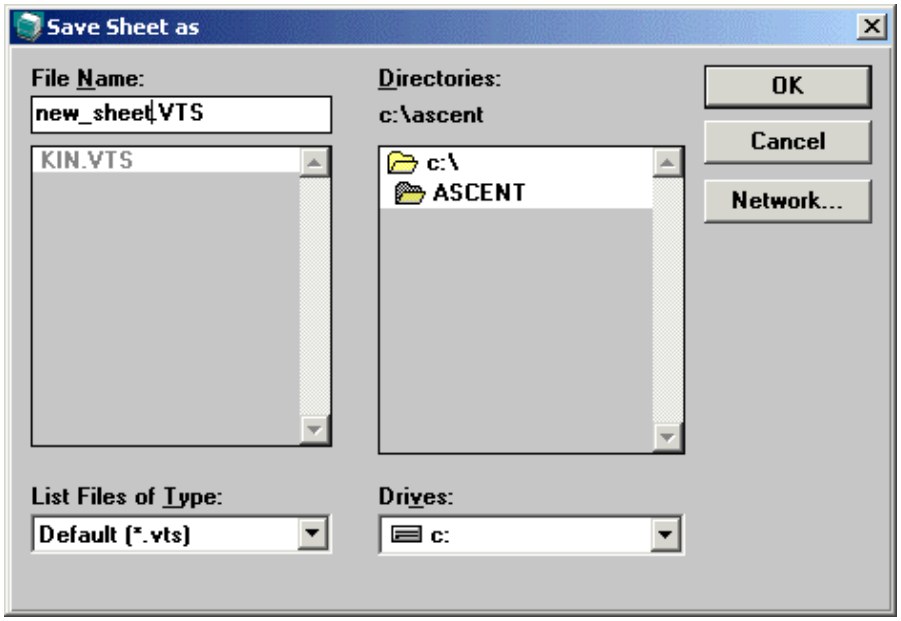
Saves the active sheet. This command replaces the previous version of the sheet with the current version. The sheet is still displayed in the window.

Note: When the **Measure** sheet is saved in *.txt and *.xls file formats, it will contain hidden measurement times and plate layout information.

3.2.7.4 Save Sheet As...

Save Sheet As... (Sheet menu)

Use this command to save the sheet with a new name.



The sheet remains open. You can also use this command to save files so they can be read in other applications.

- **File Name.** Saves the worksheet in the current directory unless you type a full path for the worksheet or select a different directory from the directory listing. Type a name for the worksheet or accept the proposed name.

Note: DO NOT use any names more than 8 characters long. Ascent Software does not support long names.

- **Directories**. Lists the current directory and any subdirectories. Double-click the directories and subdirectories to move through the list.

- **List Files of Type.** Lists the available file formats that allow you to save a worksheet for use in another application. The formats available vary according to the active worksheet.
- **Drives.** Lists the available drives. Select the drive to which you want to save the worksheet.
- **Network...** . Displays a dialog box of available network servers so you can connect to a different server when your system is running on the supported network.

3.2.7.5 Advanced Copy

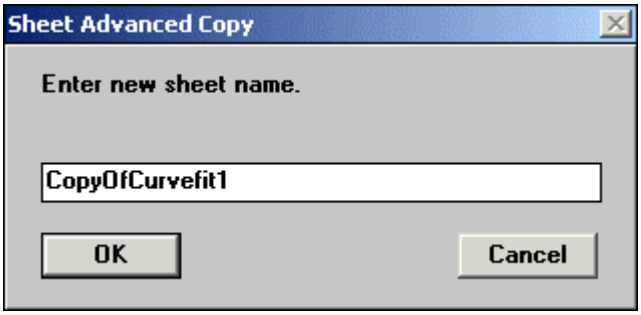
Advanced Copy (Sheet menu)

Use this command to make an almost exact copy of a sheet.

Note: The Advanced Copy is, however, not locked, as opposed to the **Measure** sheet where the values in the sheet cannot be tampered with.

All values, colors and cell names are copied to the new sheet. The currently active sheet is always the source sheet of the Advanced Copy command and the name of the target sheet is requested in the dialog.

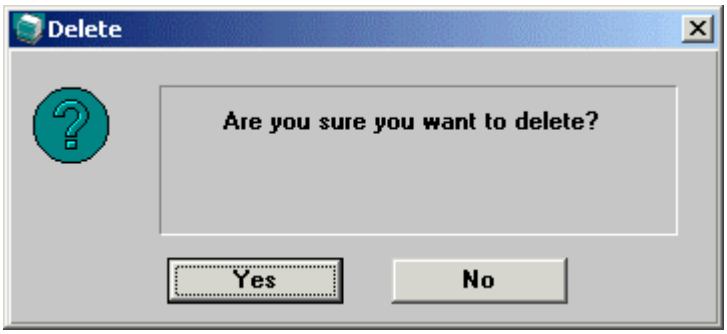
Note: The Advanced Copy sheet can be made active by linking the source data to the Advanced Copy. The Advanced Copy sheet is not updated automatically when changes regarding plate layout, area definition etc are carried out.



3.2.7.6 Delete Sheet

Delete Sheet (Sheet menu) or

Use this command to delete the current worksheet.



Warning!

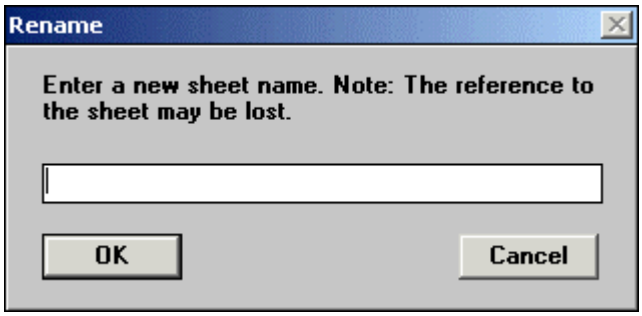
If you press the **YES** button, you cannot undo this command.

3.2.7.7 Rename Sheet

Rename Sheet (Sheet menu)

Use this command to rename the active sheet.

Note: Automatically generated sheets (**Measure1**, **Steps**, **RunStatus**, **Measure1 Curves**) cannot be renamed. The renaming of a sheet can cause the references to be lost.



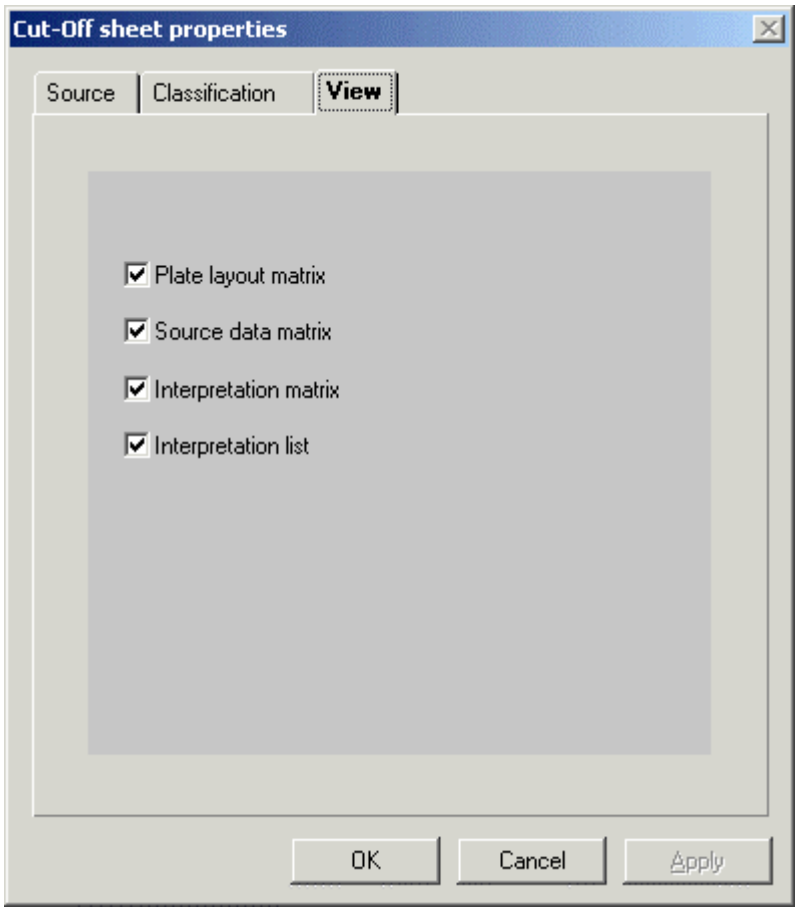
3.2.7.8 Properties...

Properties... (Sheet menu) or

Use this command to change the sheet properties.

Most sheets (except e.g. **Advanced Copy**, **New**, **RunStatus** and **Steps**) have properties which can be changed in the **Properties** dialog. Each sheet type has its own type of properties (see example below).

Most sheet types include the **Source** sheet information and the possibility to change the **View** of the sheet.



3.2.8 Process

3.2.8.1 Function...

Function... (Process menu)

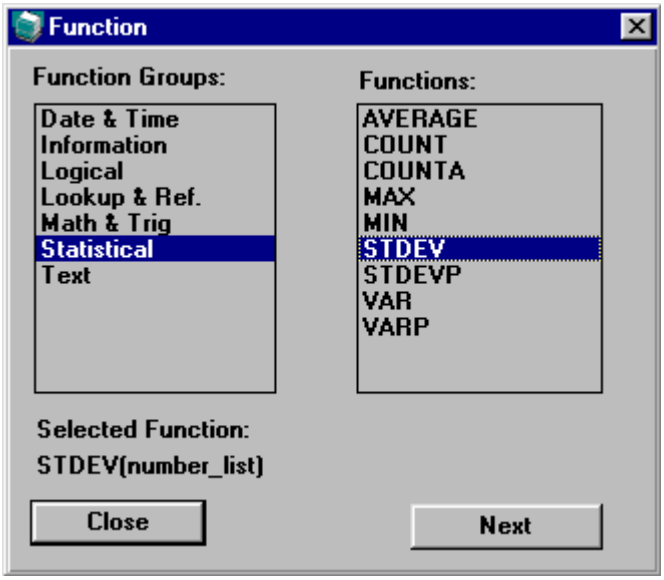
Use this command to run the Function dialog.

The Function dialog allows you to create formulas easily. By using the Function dialog the formatting is made exact and the possibilities of typing errors occurring is eliminated. Just select the function group and

function from a list and enter the function arguments. When you select a function from the list box, the definition of the function and of its arguments will automatically appear, as well as the correct placement of commas and parentheses. When an argument is followed by an extension_list, you can have more than one argument of that data type. You can have up to 30 arguments for some functions, as long as the total number of characters in the formula does not exceed 1024. In addition, no individual string can be longer than 255 characters.

The user can, if accustomed to it, key in the equations into the cell without using the **Function** dialog.

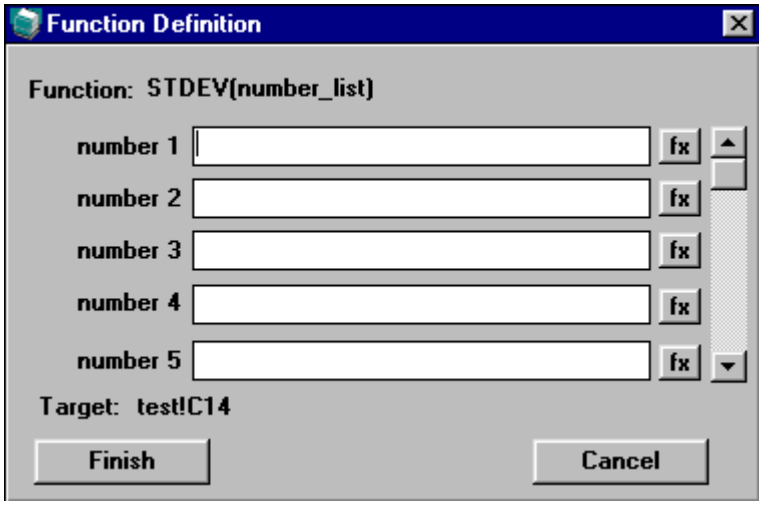
Example STDEV (Standard deviation)



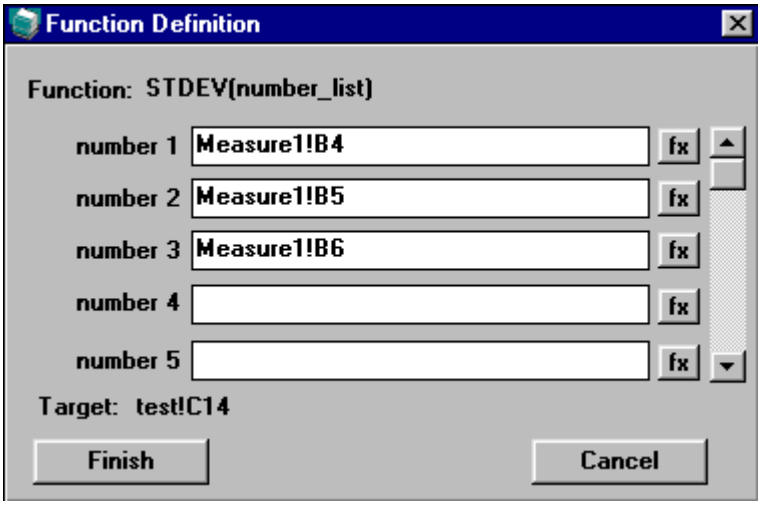
- **Function Groups.** Displays the names of the function groups.
- **Functions.** Displays all the functions in a current function group.
- **Selected Function**. Displays the function syntax.
- **Close.** Closes the **Function** dialog.
- **Next**. Allows you to enter values for the arguments.

Note: When the **Function** dialog is displayed, you can select the target cell where you want to insert the function. The default target is the selection made before the **Function** dialog was started.

When the **Next** button is pressed:

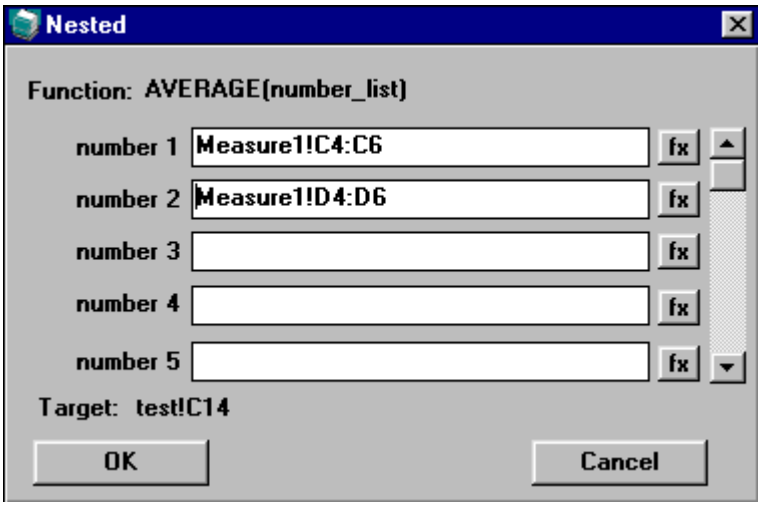


Select cells from the **Measure** sheet by using the mouse (number 1, number 2 and number 3). Place the cursor in the argument field where you want to enter the selection. Type the argument or select the area by using the mouse. By clicking the **Function Definition** dialog the selected area is updated (number 1 etc fields).

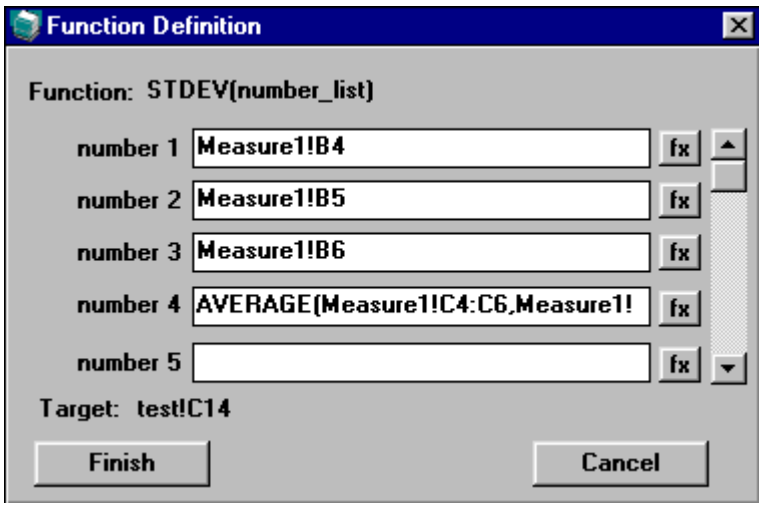


Number 4 is defined by using the AVERAGE (number_list) function.

Note: **Place the cursor in field number 4.** Then select the function button fx (at the end of line number 4) from the **Function Definition** dialog. Select Statistical/AVERAGE and press the **Next** button.



The **Nested** dialog is displayed. Select or key in the arguments. Typing errors can easily occur when you key in the arguments yourself instead of using the selection. When you press the **OK** button, the AVERAGE function appears in field number 4 (or in the location where the cursor is).

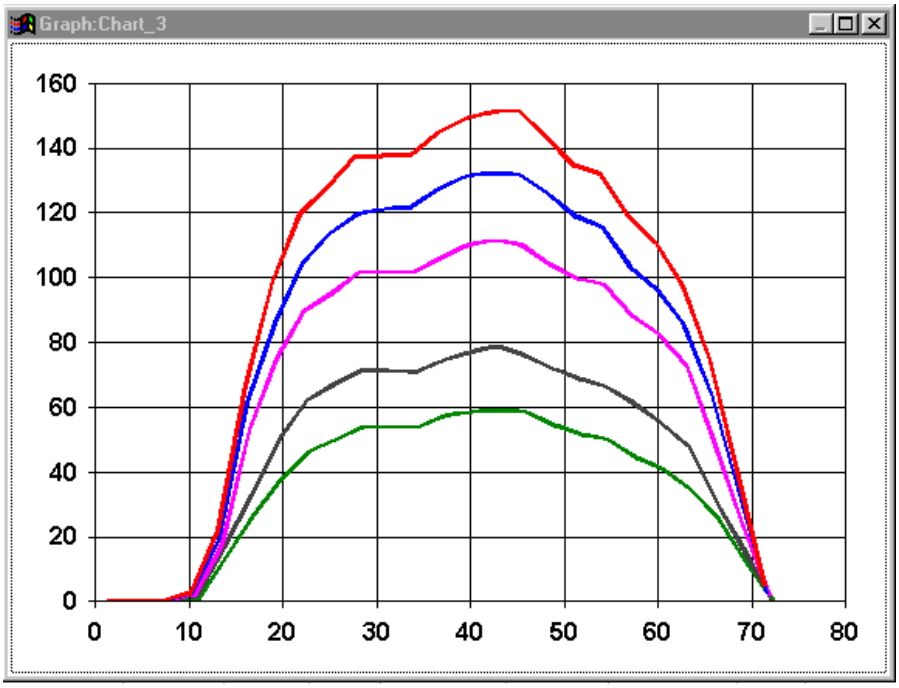


When the **Finish** button is pressed, the entered formula is inserted into the **Target** location.

3.2.8.2 Graph

Graph (Process menu)

Use this command to run the Graph tool.



Note: In the worksheet, first select the data you want to plot, including the cells containing any category or series of names that you want to use on the chart and select Graph from the menu.

Note: It is highly recommendable to collect the source data into a custom-made sheet and to create the graphs in the new sheet.

You can edit the metafile object (e.g. cut, copy, paste, clear, insert, remove).

Double-click the metafile object (graph) to generate an Edit window. In the Edit (**Format Plot**) window you can customize your chart by clicking

the right mouse button (see the **Reference** part of the manual for more details).

When the data is updated, the metafile object updates itself.

You can e.g. copy and paste the metafile object by using the right mouse button and selecting the operation outside the Graph. Clicking the right mouse button inside the Graph borders produces a different pop-up menu.

If you want to delete the metafile object, first exit the Graph, activate the metafile object and then select **Clear** from the pop-up menu that appears after clicking the right mouse button. Otherwise relevant values are cleared.

3.2.8.3 Organize...

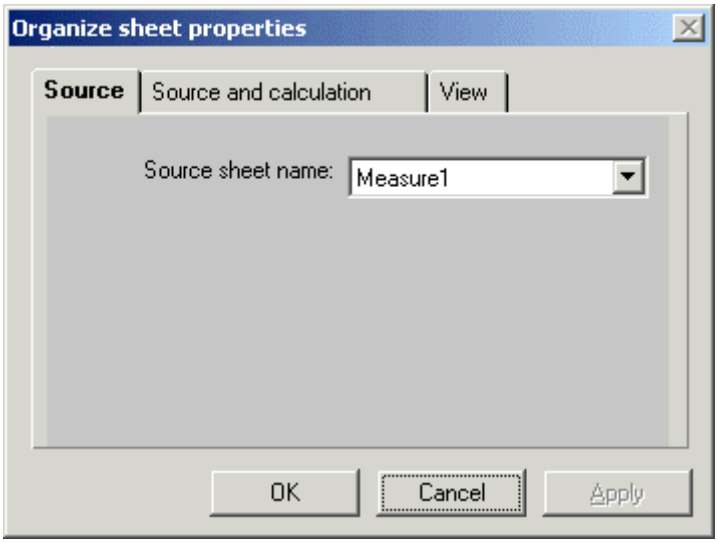
Organize... (Process menu)

Organizes the measurement results. This allows the user to create charts and handle data more easily.

The Organize… command creates a new sheet and reorganizes the kinetic data (rows by measurement count and columns by well address) by using relative addressing. It is not recommended to write your own data in the unused cells in the **Organize** sheet since the data is destroyed when the session is rerun.

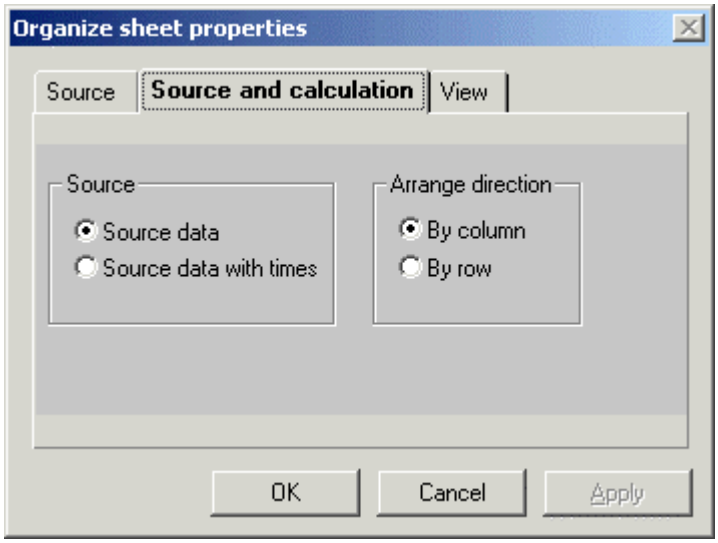
In the **Properties** dialog you can give the parameters for the sheet.

3.2.8.3.1 Source



- **Source sheet name.** Select the sheet containing the data you want to organize.

3.2.8.3.2 Source and calculation



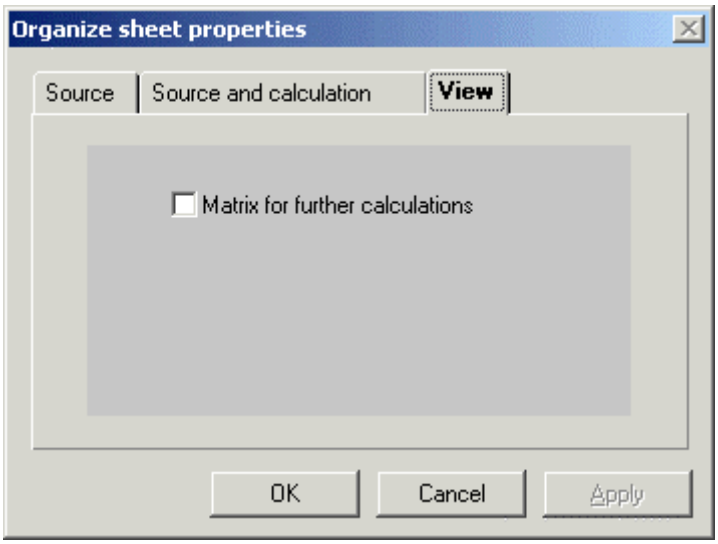
- **Source data.** Measurement data is organized.
- **Source data with times.** Both measurement data and measurement times are organized.

Arrange direction

- **By column.** Data is organized by column.
- **By row.** Data is organized by row.

3.2.8.3.3 View

See display figure below. A result matrix for further calculations can be selected.



If matrix is used, formulas need to be entered into the cells of the matrix, e.g. AVERAGE (B16:B100).

Note: The user's own formulas might disappear from the sheets created automatically by the software when the session is rerun. If you want to maintain the formulas, it is recommended that you use the **Sheet → Advanced Copy** function.

3.2.8.4 Multipoint...

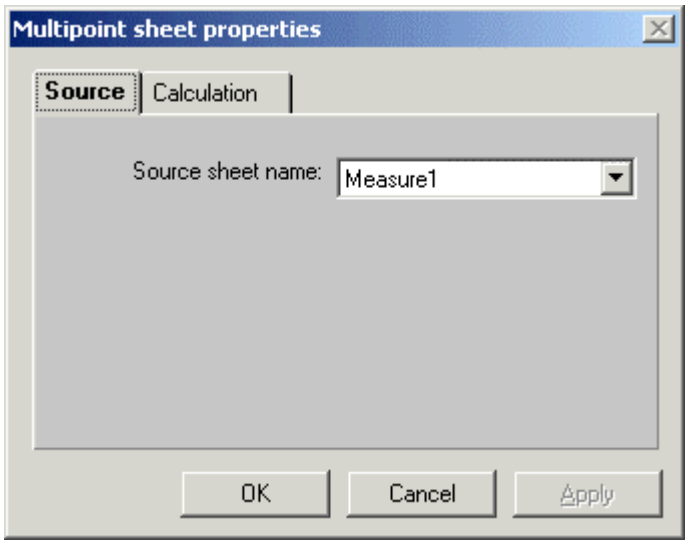
Multipoint... (Process menu)

The Multipoint feature is designed for large wells, i.e. microplates with less than 96 wells, whereby more than one measurement point per well can be measured.

Multipoint feature reduces the data to one value per well. This is necessary since further data reduction cannot be performed if there is more than one measurement value per well.

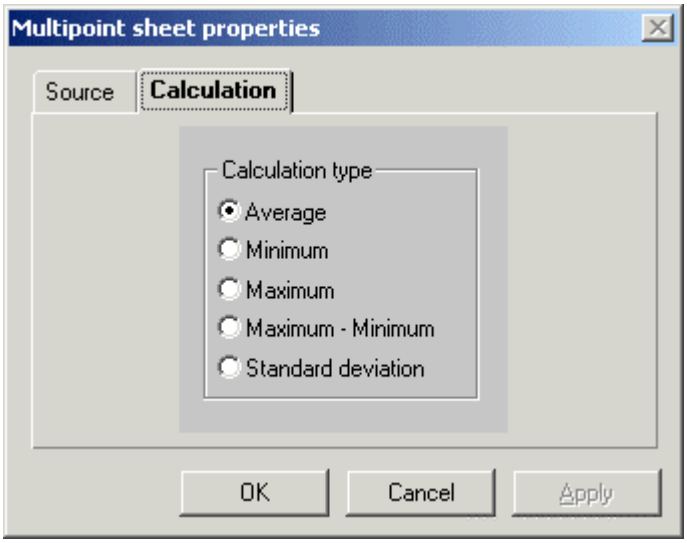
In the **Properties** dialog you can give the parameters for the sheet.

3.2.8.4.1 Source



- **Source sheet name.** Select the sheet containing your measurement data.

3.2.8.4.2 Calculation



Only one result per well is calculated from all the measurement points of the well. The user can select how the measurement points will be calculated. The different calculation types comprise: Average, Minimum, Maximum, Maximum - Minimum, and Standard deviation.

The operation buttons are:

- **OK.** Applies the selected calculation type used in the Multipoint calculations to the well(s) and closes the dialog.

- **Cancel.** Cancels the dialog.

- **Apply.** Applies the selected calculation type used in the Multipoint calculations to the well(s).

The results from Multipoint calculations can be used in further calculations, i.e. curve fits, cut-offs, precalculations and various sheets can be combined.

Note: Disabled values in **Measure** sheets affect the calculation results in Multipoint calculations.

3.2.8.5 Blank Subtraction...

Blank Subtraction... (Process menu)

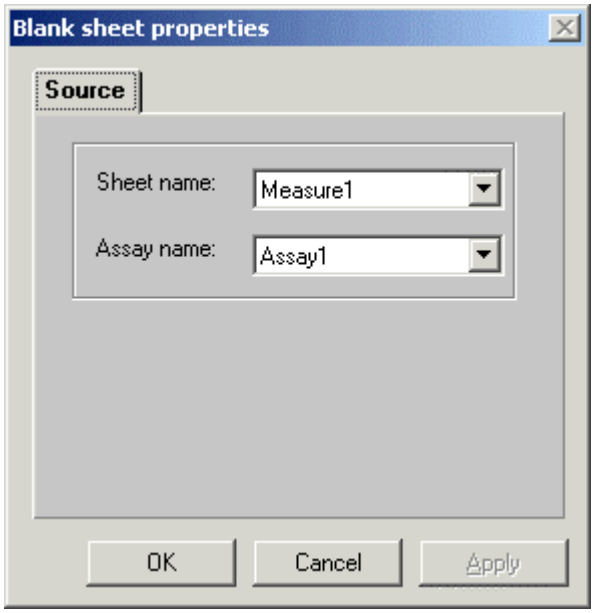
The blank well(s) is (are) subtracted automatically from the source sheet and the result is displayed in this sheet. If a blank has been defined in the plate layout, the blank is automatically subtracted in this sheet. If several blanks are involved, the mean of the blanks is subtracted.

The calculated mean blank value used in the blank subtraction calculation will be displayed in well D2 in the blank subtraction sheet.

The mean blank value will also be displayed in Curve-Fit and Cut-off sheets. If no blank value is available, the text N/A will be displayed instead of the mean blank value.

The mean blank value is calculated as the average of all non-specific blanks in the layout. If no non-specific blanks are defined, the text N/A will be displayed in well D2.

In the **Properties** dialog you can give the parameters for the sheet.



- **Source sheet name.** Select the sheet containing your measurement data.

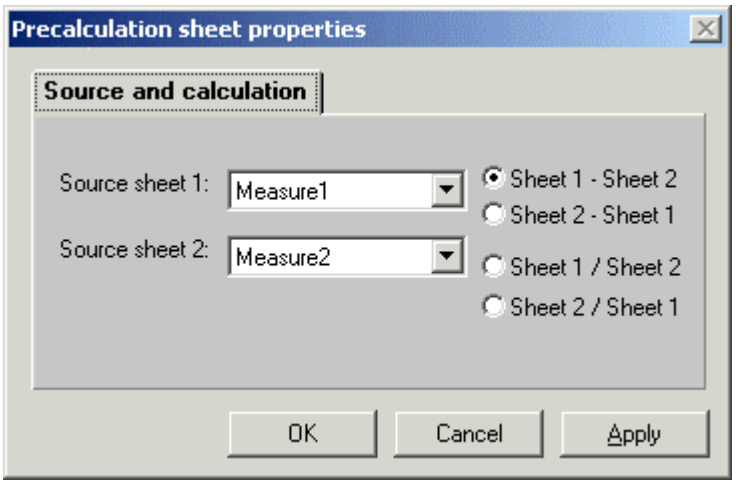
- **Assay name.** Specifies the assay name for the source.

3.2.8.6 Precalculation...

Precalculation... (Process menu)

This menu item creates a precalculation sheet, which offers a possibility to carry out simple calculations, such as subtractions and ratios, with measurement data. This sheet does not need a plate layout.

In the **Properties** dialog you can give the parameters for the sheet.



- **Source sheet 1.** Defines the name of the first source sheet.
- **Source sheet 2.** Defines the name of the second source sheet.
- **Sheet 1 - Sheet 2.** The measurement data of the second sheet is subtracted from the measurement data of the first sheet.
- **Sheet 2 - Sheet 1.** The measurement data of the first sheet is subtracted from the measurement data of the second sheet.
- **Sheet 1 / Sheet 2.** The measurement data of the first sheet is divided by the measurement data of the second sheet.

- **Sheet 2** / **Sheet 1**. The measurement data of the second sheet is divided by the measurement data of the first sheet.

Note: The **Precalculation** submenu is **typically used e.g. in dual** (using two filters/filter pairs) measurements.

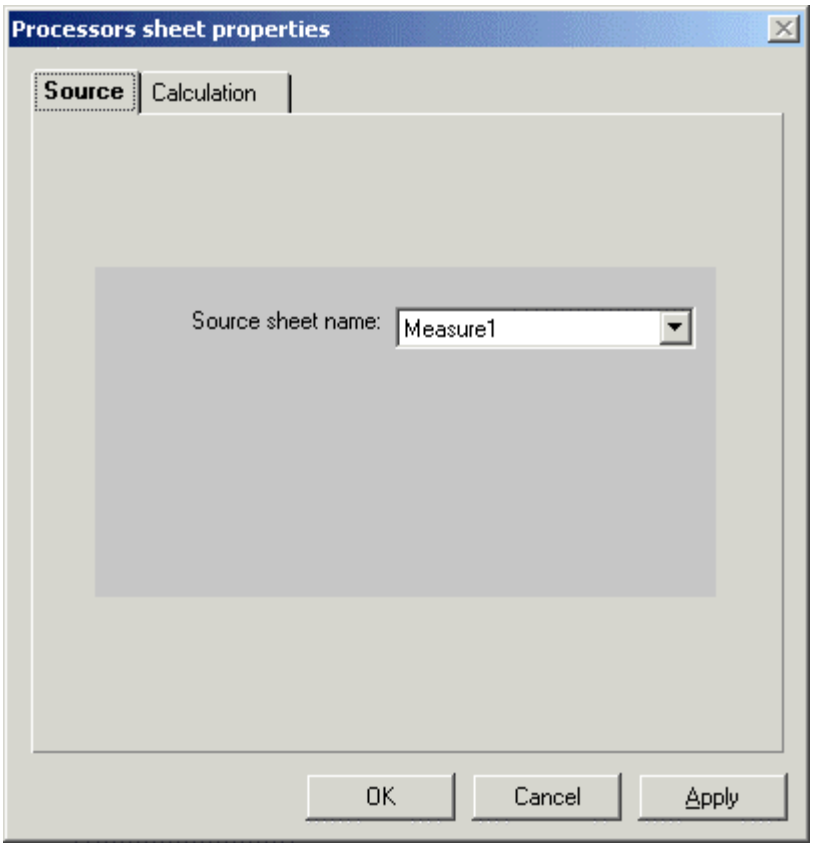
3.2.8.7 Kinetic Processors...

Kinetic Processors... (Process menu)

This menu item creates a processor sheet, which offers a possibility to perform kinetic calculations. This sheet does not require a plate layout.

In the **Properties** dialog you can give the parameters for the sheet.

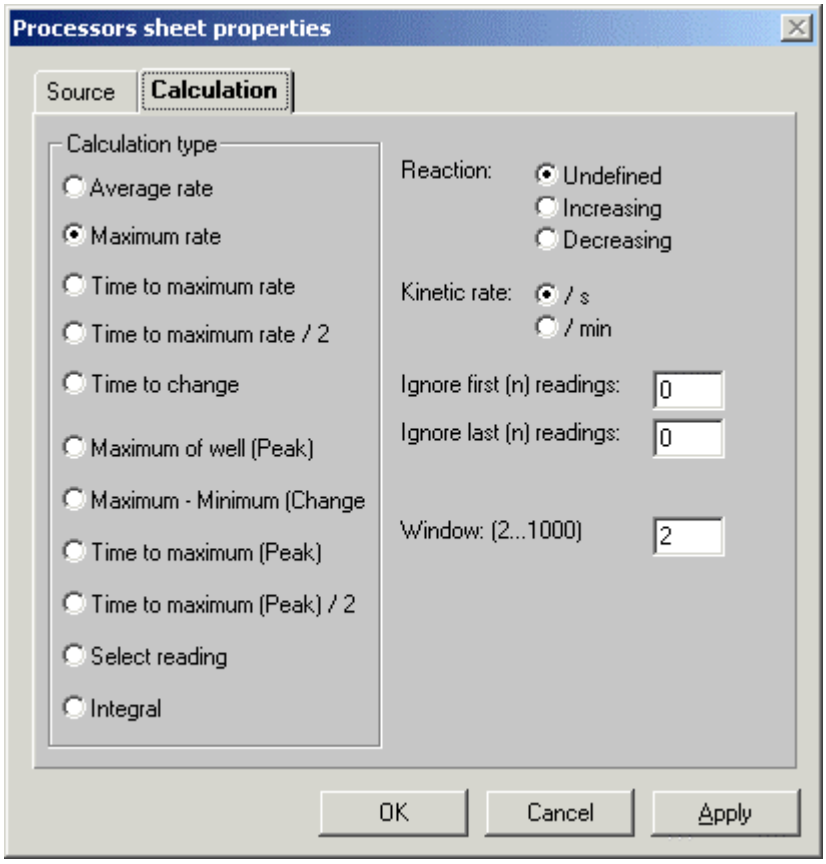
3.2.8.7.1 Source



- **Source sheet name.** Select the sheet containing your kinetic measurement data.

The measurement type has to be Kinetic, Dual Kinetic, or Monitor.

3.2.8.7.2 Calculation



Different calculation types (left column) have different options (right column) available. The options are listed under each calculation type.

The processing results of **Maximum rate**, **Time to maximum rate**, **Time to maximum rate/2** and **Time to change** are based on the chosen kinetic reaction course (Undefined, Increasing, or Decreasing).

Calculation type

- **Average rate.** Also known as normal rate. The slope of the reaction will be calculated from the raw data and time stamps for each well using the linear least squares method (LLS) of all n fluorescence/luminescence readings. The average kinetic rate (slope of the A (= fluorescence/luminescence) vs. time curve) will be calculated by linear regression using all the data points within the selected raw data and time range.
    - **Kinetic rate / s or Kinetic rate / min.** The Kinetic rate is calculated per second or per minute.
    - **Ignore first (n) readings**. Ignores a defined number of readings. Starts from the first reading.
    - **Ignore last (n) readings**. Ignores a defined number of readings. Starts from the last reading.
- **Maximum rate.** If the maximum rate is selected, the program searches the data for the maximum rate found in each well. To obtain the maximum rate a series of linear curve fits will be performed for different segments of the fluorescence/luminescence vs. time curve. The first segment starts at the first data point within the selected time and fluorescence/luminescence range, the second segment starts at the second data point etc until all the data points have been analyzed. All the rate calculations are evaluated to determine the maximum rate. In other words, the LLS fit of m span points are sequentially fitted through each of the n data points. There will be n-m+1 curves produced from this. The number of data points in a segment is specified by the user. The maximum rate option is useful, if you are not able to select the linear part of the curve using fluorescence/luminescence and time limits.
    - **Undefined**. Searches for the absolute maximum rate. If the highest absolute rate value is increasing it will be presented with the prefix "+". If the maximum rate is decreasing it will be presented with the prefix "-".
    - **Increasing**. Searches for the maximum increasing rate. The rate is presented with the prefix "+". If no increasing rate is found the result is "0" (zero).

- **Decreasing**. Searches for the maximum decreasing rate. The rate is presented with the prefix "+". If no decreasing rate is found the result is "0" (zero).
- **Kinetic rate / s or Kinetic rate / min**. The Kinetic rate is calculated per second or per minute.
- **Ignore first (n) readings**. Ignores a defined number of readings. Starts from the first reading.
- **Ignore last (n) readings**. Ignores a defined number of readings. Starts from the last reading.
- **Window (2...1000)**. The number of consecutive readings to use for evaluation. The highest reaction rate for each well is calculated using a sliding window. A *window* defines how many measurement points are included in the calculations. When the measurement results are calculated, the means are used. The size of this window is given in the Window parameter box. For example, if the number of measurements is ten and the Window parameter is three, the system will calculate the first rate using the measurements 1 to 3, the second rate using the measurements 2 to 4, and so on until all the measurement points have been handled. The system will give the maximum value of the calculated rates.

- **Time to maximum rate**. The time to maximum rate is calculated similarly to the maximum rate, but the result is reported as the time in seconds from the first reading to the endpoint of the sliding window in seconds instead of the rate itself.
  - **Undefined**. Searches for the absolute maximum rate (see *Maximum rate* above) and returns the corresponding time as a positive number.
  - **Increasing**. Searches for the maximum increasing rate (see *Maximum rate* above) and returns the corresponding time as a positive number. If no increasing rate is found, the result is "0" (zero).
  - **Decreasing**. Searches for the maximum decreasing rate (see *Maximum rate* above) and returns the corresponding time as a positive number. If no decreasing rate is found, the result is "0" (zero).

- **Window (2...1000)**. The number of consecutive readings to use for evaluation.

- **Time to maximum rate/2.** The time to maximum rate/2 is the time taken to reach half of the maximum rate. The maximum rate is determined as above. This rate is halved and the data is scanned to determine the first rate, which exceeds this rate.
  - **Undefined**. Searches for the absolute maximum rate (see *Maximum rate* above), calculates the half of the maximum rate, and returns the corresponding time as a positive number.
  - **Increasing.** Searches for the maximum increasing rate (see *Maximum rate* above), calculates the half of the maximum rate, and returns the corresponding time as a positive number. If no increasing rate is found the result is "0" (zero).
  - **Decreasing.** Searches for the maximum decreasing rate (see *Maximum rate* above), calculates the half of the maximum rate, and returns the corresponding time as a positive number. If no decreasing rate is found the result is "0" (zero).
  - **Window (2...1000)**. The number of consecutive readings to use for evaluation.

- **Time to change.** The time to change is used for calculating the time required to reach a defined change in the signal (in each well). The time is given in seconds from the first reading to the endpoint of the sliding window in seconds.
  - **Undefined**. Searches for the defined change in signal, regardless of the rate polarity (positive or negative), and returns the corresponding time as a positive number.
  - **Increasing**. Searches for the increasing defined change in signal and returns the corresponding time as a positive number. If no increasing rate is found the result is "0" (zero).
  - **Decreasing**. Searches for the decreasing defined change in signal and returns the corresponding time as a positive number. If no decreasing rate is found the result is "0" (zero).
  - **Base line (1...1000).** The Base line parameter is the number of initial readings used for the base line calculation. The base line can also be zero, which means that the comparison will

be made against zero. In Base line the program chooses as many measurement points as exist in the base line and calculates the mean thereof. The mean equals the base line value.

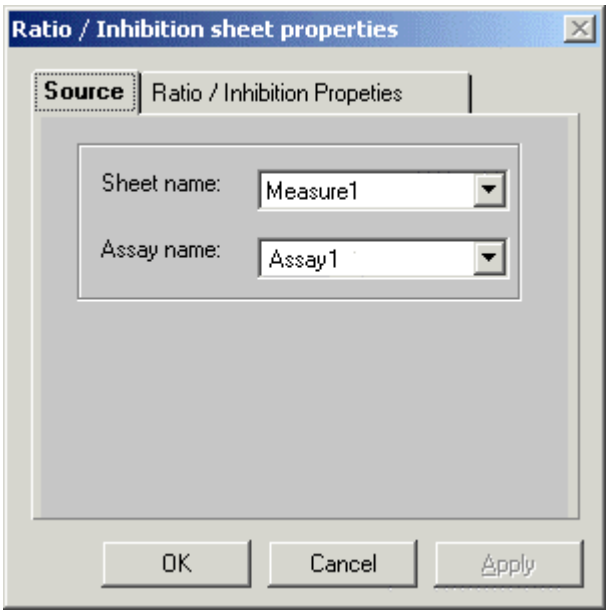
  - **Change (Relative % or Absolute).** The relative change from the base line in percent or then the absolute change. The change in signal is specified in the Change parameter and is compared to the base line. The *Window* parameter here means the number of consecutive measurements which should reach the change before the result is accepted.

- **Maximum of well (Peak).** The maximum of well is used to search the maximum value of the well.
- **Maximum - Minimum (Change).** The minimum measured value of the well is subtracted from the maximum measured value of the well.
- **Time to maximum (Peak).** The time to maximum is used to calculate the time elapsed before the peak is reached. The time is given in seconds.
- **Time to maximum (Peak)/2.** The time to maximum/2 equals the time to reach half of the maximum value.
- **Select Reading.** Select reading is used to select the measurement.
  - **Reading Index (1...1000).** The index of the kinetic measurement. Enables the user to select the kinetic measurement that is wanted in further calculations.
- **Integral**. Estimates the area under the curve. The starting point can be moved (**Ignore first (n) readings**).
  - **Ignore last (n) readings**. Ignores a defined number of readings. Starts from the last reading.

3.2.8.8 Ratio/Inhibition

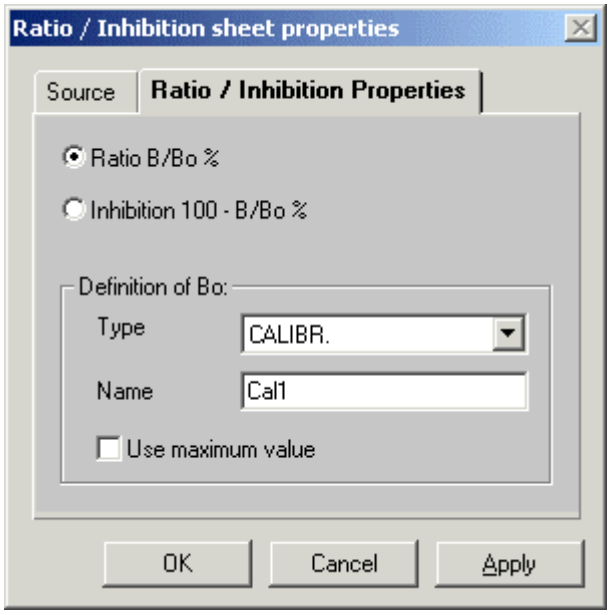
Ratio/Inhibition (Process menu)

3.2.8.8.1 Source



- **Source sheet name.** Select the sheet that contains the measurement data.
- **Assay name.** Specifies the assay that contains the desired data.

3.2.8.8.2 Ratio/Inhibition Properties



Creates a Ratio/Inhibition sheet. The user can select either Ratio (i.e. B/B_0%) or Inhibition (i.e. 100% - B/B_0%). The user selects the source for B_0 from the layout well types and names. The mean value of the sample selected (if replicates do exist), will be used in further calculations. The user can also select the maximum value of the specified type through the **Use maximum value** selection.

3.2.8.9 Curve Fit...

Curve Fit... (Process menu)

Creates a Curve Fit sheet, calculates the curve fitting and the concentration of the samples.

Note:

- The Curve Fit requires that calibrators have either been defined in the plate layout or that calibrators have been loaded from a file.

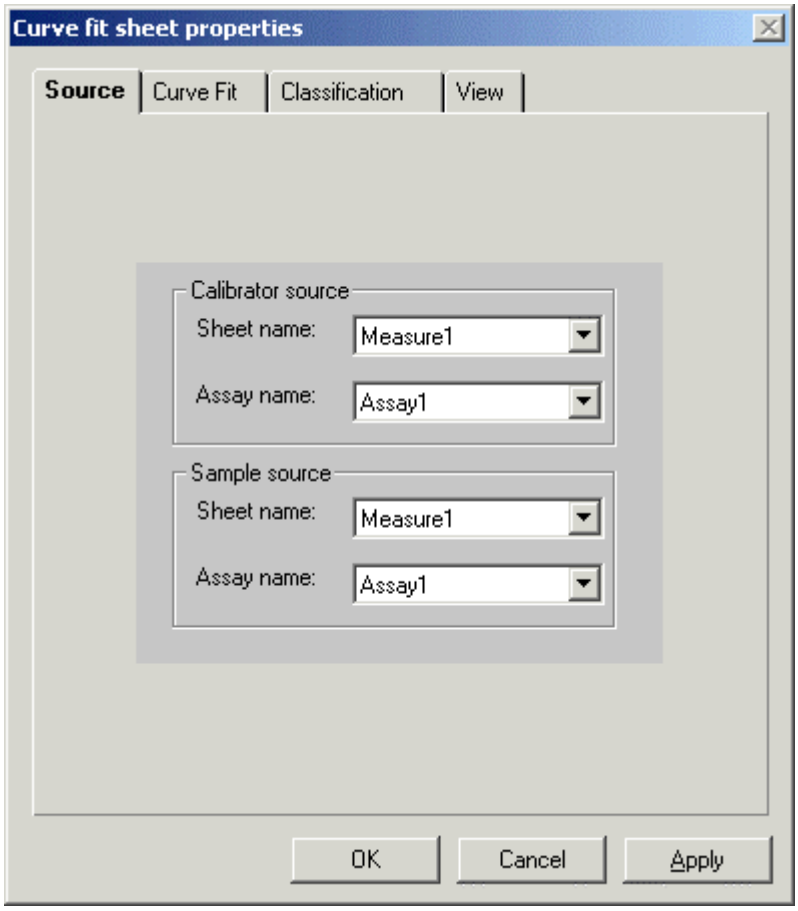
- Any modification in the sheet properties will erase user modifications, **Enable**/**Disable** information or any other added information. However, added information stays in the two comment columns in the concentration list, as well as the comment wells (wells H4 – H7) at the top of the **Curve Fit** spreadsheet.

The colors of the names of the specimen in the Curve Fit sheet (Layout map matrix, Source data matrix, and Calculated concentrations matrix) are the same as the defined colors of the different well types, i.e. calibrators, controls, blanks, and samples (see Section **Setup|Colors** in the **Procedure Desktop** part of the manual).

Note: There are no colors in the Concentration list.

In the **Properties** dialog you can give the parameters for the sheet.

3.2.8.9.1 Source



Calibrator source. Specifies the source sheet for the calibrators and the assay name of the specific, selected Assay in that sheet.

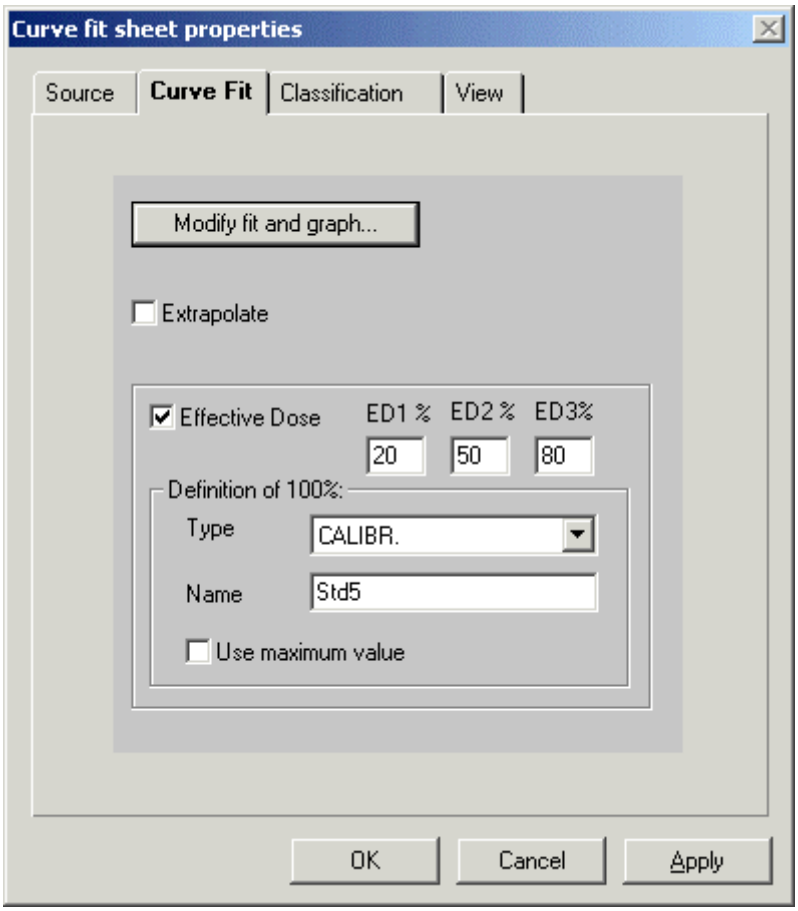
- **Sheet name.** Specifies the name of the source sheet for the calibrators.
- **Assay name.** Specifies the assay name for the calibrator source.

Sample source. Specifies the source sheet for the samples and the assay name.

- **Sheet name.** Specifies the name of the source sheet for the samples.

- **Assay name.** Specifies the assay name for the sample source.

3.2.8.9.2 Curve Fit



- **Extrapolate.** Automatic extrapolation can be selected. Extrapolation generally means the estimation of the value of a function (given other values of the function) at a point beyond the interval in which the calibrator data lies. When Extrapolate is not selected, the concentrations of the sample values which are smaller than the

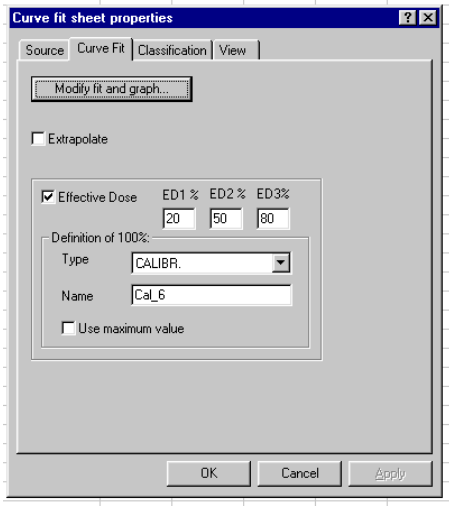
lowest value of the calibrators or greater than the highest value of the calibrators are not calculated. If Extrapolate is selected, the concentrations are calculated for those measurement values outside the interval in which the measured calibrator values lie.

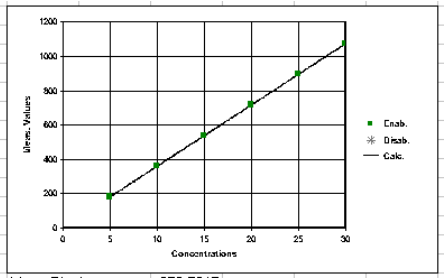
Note: If Extrapolate is not selected and the calibrators have replicates, then the value(s) of the lowest calibrator under the calculated average for the replicates will be listed "<min". Correspondingly, the value(s) of the highest calibrator over the calculated average for the replicates will be listed ">max".

Note: Extrapolated values are in bold facetype.

- **Effective Dose.** The Effective Dose or ED calculation scales the calibration curve. A percent scale is plotted on the Y-axis instead of the measured value. A selected signal specified by the selected well type and typed well name is set to 100%. The user can also select the maximum value of the specified type through the **Use maximum value** selection. The signal of all other measurements is calculated as the percentage of the maximum signal. It is possible to define three different ED values (ED1%, ED2% and ED3%) and obtain the corresponding concentrations automatically calculated for these (see figure below).

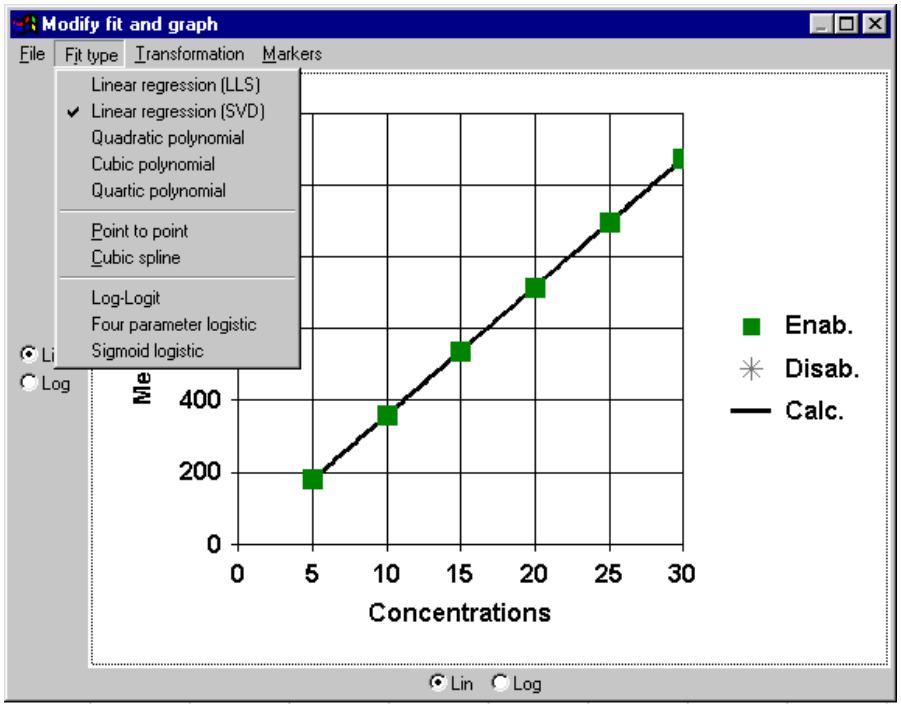
Example





Mean Blank	670.7317	
Status:		
Remark:		
Fit type:	Linear regression (SVD): y = a+b*x	
Meas. transformation:	Linear	
Conc. transformation:	Linear	
Parameters:	a	b
	-3.33E-05	35.7724
Corr. coeff. R2:	1.0000	
Effective Dose:		
ED1 20%	23.999992	
ED2 50%	14.999995	
ED3 80%	5.9999986	

3.2.8.9.2.1 Modify fit and graph...



Note: In some cases the warning message "Not enough data" can be seen in the **Modify fit and graph** dialog. The user can, however, create the Curve Fit sheet by pressing the **OK** button.

File

The **Curve Fit → Modify fit and graph** window can be closed here.

Fit type

Select the type of curve fit algorithm (Linear regression (LLS), Linear regression (SVD), Quadratic polynomial, Cubic polynomial, Quartic polynomial, Point to point, Cubic spline, Log-Logit, Four parameter logistic, Sigmoid logistic).

Polynomial fit

Generally the polynomial fit function is determined as:

$y = x + ax + bx^2 \ldots mx^n$, where $n = 1, 2, 3$ or 4.

Derived from the above equation:

- $y = a + bx$ for **Linear Regression (SVD)** and the minimum number of calibrators is 2.
- $y = a + bx + cx^2$ for **Quadratic polynomial** and the minimum number of calibrators is 3.
- $y = a + bx + cx^2 + dx^3$ for **Cubic polynomial** and the minimum number of calibrators is 4.
- $y = a + bx + cx^2 + dx^3 + ex^4$ for **Quartic polynomial** and the minimum number of calibrators is 5.

In the equations above y equals the measured signal and x equals the concentration. a, b, c, d, and e are the coefficients specific to each degree of the fit function.

Coefficients of the functions are solved with the least squares algorithm using singular value decomposition (SVD).

Roots of the polynomial, i.e. "the results", are calculated with an iterative Laquerre's method. If more than one root is found in the calibration area, the method returns a warning.

You can also select a method that is commonly used by spreadsheet programs; a straight forward linear least squares (LLS) method. This method might produce slightly different values for the coefficients a and b, but neither of these two methods (SVD or LLS) can be considered absolutely better than the other.

- $y = a + bx$ for **Linear Regression (LLS)** and the minimum number of calibrators is 2.

Point to point

The point to point method connects the adjacent response-concentrations coordinates, i.e. the calibration points, together using a straight line ($y_i = a_i + b_i x_i$) different for each of the intervals. The results are calculated by searching first the correct interval and then using the corresponding equation. The minimum number of calibrators for this fit type is 2.

Cubic spline

This method is a smoothed point to point method where the adjacent calibration points are connected together using cubic polynomials ($y_i = a_i + b_i x_i + c_i x_i^2 + d_i x_i^3$) and optimizing the connecting points as smoothly as possible to avoid sharp angles. The results are calculated by searching first the correct interval and then using a bi-section method to find the answer from the corresponding equation. The minimum number of calibrators for this fit type is 2.

Sigmoid logistic, Log-Logit and Four parameter logistic functions

All the three fit function methods use the same fit model:

$$y = b + \frac{(a - b)}{(1 + xc)^d}$$

In the equation above y is the signal, x the concentration, a the maximum signal (asymptote above), b the minimum signal (asymptote below), c the concentration at inflection point and d a slope-related term at the inflection point.

The difference between these three models is that they solve coefficients of the equation above differently. The minimum number of calibrators for these fit types is 4.

- **Sigmoid logistic.** The coefficients of the function are solved using the Levenberg-Marguardt method.
- **Four parameter logistic.** The coefficients of the function are solved with the least squares algorithm using singular value decomposition (SVD).

- **Log-Logit.** The *a* and *b* coefficients are treated as known otherwise it is the same as the sigmoid logistic fit.

Transformation

Data Transformation trailing occurs prior to fit calculation. Transformation of statistical data means in brief a change of scale used to improve the validity of statistical analyses. The default is Linear-Linear for concentration and measurement linear. The type of Data Transformation can represent either concentration linear, concentration logarithm (LOG 10), measurement linear or measurement logarithm. Logarithmic transformation is employed when data dynamics is considerable. This facilitates mathematical adaptions, i.e. curve fitting.

Note: If the concentration range of the calibrators is more than four decades, logarithmic transformation should be used to obtain more precise curve fitting.

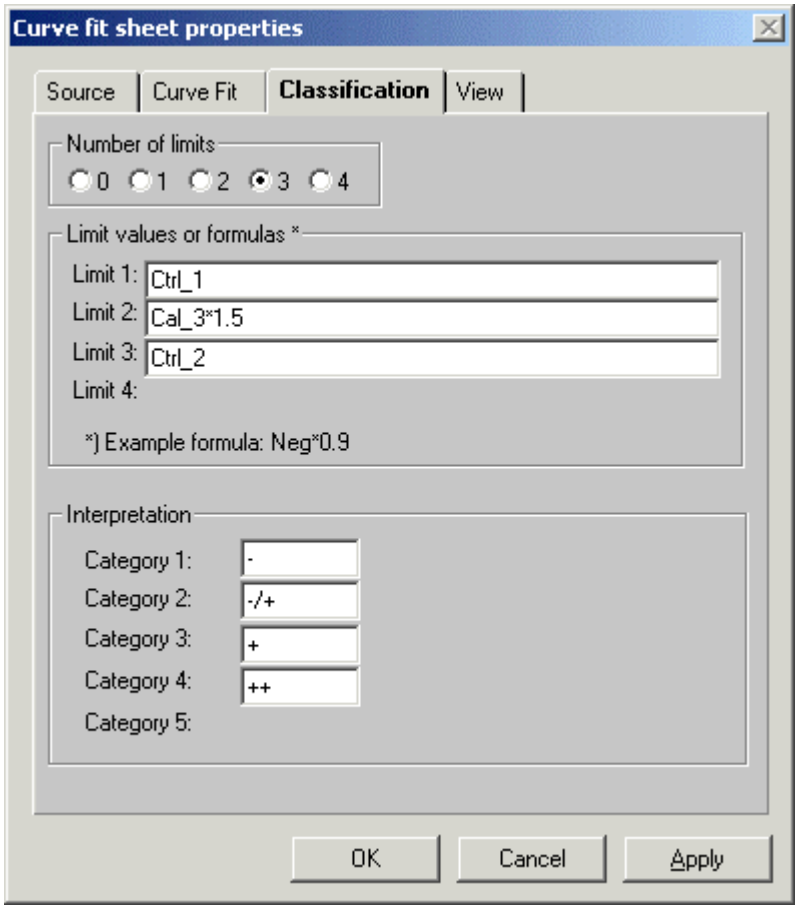
Markers

Either the means of the measurements or individual measurements (replicates) are displayed in the graph.

3.2.8.9.3 Classification

With the classification option it is possible to add cut-off interpretations to the Curve Fit sheet. The cut-off interpretations will be added to the Comment1 column in the concentration list.

Note: The Classification tab is filled in the same way in the Curve Fit and the Cut-Off functions.



- **Number of limits.** This indicates the number of limits used. The default is no limits.

- **Limit values or formulas**. Contains defined limit values or formulas to calculate the cut-off. Controls and calibrators defined in the plate layout can be used in the limit formulas. The name must be written exactly as in the layout. In case of replicates, the mean of the replicates is used in the calculations.

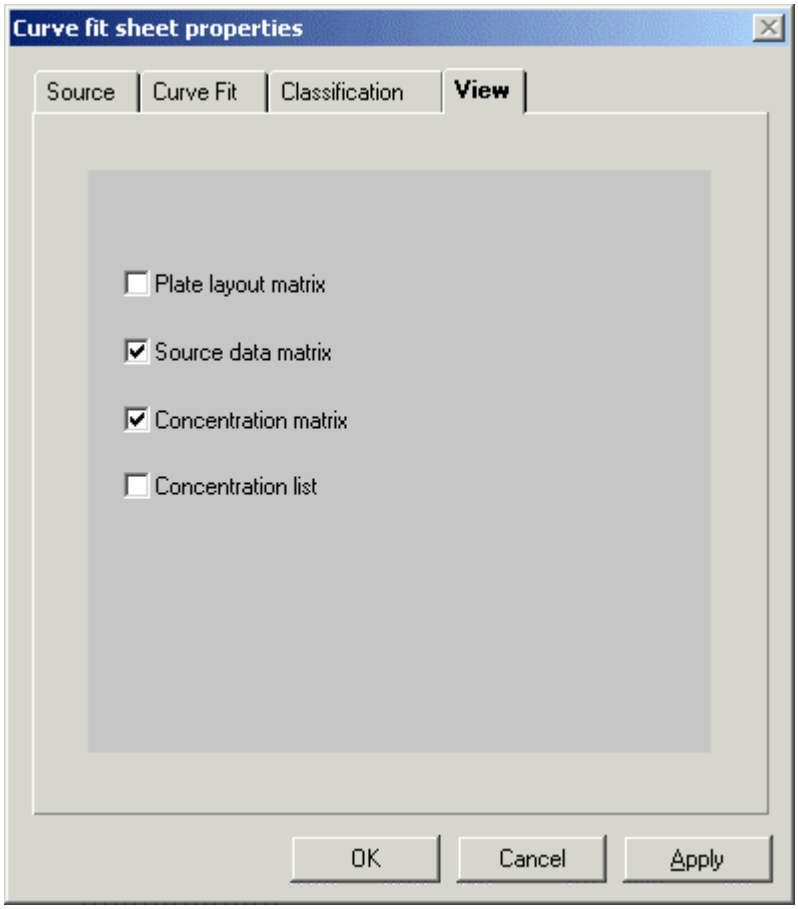
Note: It is important to update formulas if the controls used in the respective formulas are removed, deleted or all replicates disabled to obtain the correct limit values.

Interpretation

- **Categories.** Add text strings that will be displayed for the Curve Fit result categories in the Comment1 column in the concentration list in the Curve Fit sheet.

3.2.8.9.4 View

The user can select the items shown on the screen and printout with the View tab. The report consists of everything that has been carried out. The Curve Fit sheet can be used as a report sheet and through the View tab different layout options can be selected.



- **Plate layout matrix**. Adds a layout map with defined names.
- **Source data matrix**. Adds a source data matrix to the Curve Fit sheet.
- **Concentration matrix**. Calculated concentrations in plate format (e.g. 8 x 12 grid).

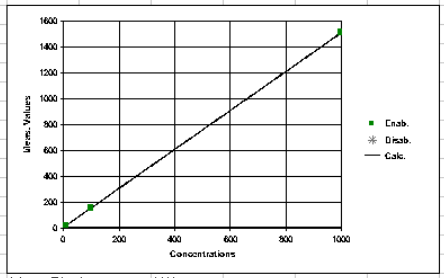
- **Concentration list**. A list of measurements, including the well name, raw data, calculated concentration, dilution factor, calculated concentration with the dilution accounted for, average of the raw data, SD, CV% and the two comment columns – Comment 1 and Comment 2, which can be used for various purposes, such as QC calculations, text and formulas or for displaying cut-off interpretations.

3.2.8.9.5 Example Curve Fit sheet

Sheet: CopyOfMeasure1, Assay: Assay1

Name	Meas.	Conc.
Cal_1	2.180	
	2.100	
	2.140	1.000
Cal_2	15.390	
	14.850	
	15.120	10.000
Cal_3	150.420	
	151.210	
	150.815	100.000
Cal_4	1515.080	
	1509.150	
	1512.115	1000.000

	Conc.	Meas.	CalcConc.	Residual
Cal_1	1.000	2.140	1.350	-0.350
Cal_2	10.000	15.120	9.935	0.065
Cal_3	100.000	150.815	99.682	0.318
Cal_4	1000.000	1512.115	1000.032	-0.032



Mean Blank	N/A	
Status:		
Remark:		
Fit type:	Linear regression (SVD): y = a+b*x	
Meas. transformation:	Linear	
Conc. transformation:	Linear	
Parameters:	a	b
	0.0983	1.5120
Corr. coeff. R2:	1.0000	

- **Calibrators (= Standards)**. A table of calibrator data, calculated responses and residual concentrations (DO NOT edit this table). Residuals describe how good the fitting is. Residuals are the calculated differences between the actual and the computed values. If the mean of the measured calibrators becomes negative, it is automatically disabled and shown in red.
- **Calibrator chart**. Calibrator data presented on a chart. Calibrators can be enabled or disabled, either as replicates or whole calibrators. Disabled calibrator points are shown in the graph (if replicates are chosen, markers become replicates).

- **Mean Blank**. The user sees the Mean Blank value given in the **Blank Subtraction** sheet, i.e. the mean of all the blank wells in a specified assay. Otherwise if nonspecific plate blanks do not exist, the text N/A (short for *not available*) appears.
- **Status**. Shows the status of the fitting.
- **Fit type**. Shows the used fit type and fit formula.
- **Transformation**. The used type of Data Transformation.
- **Parameters**. Shows the fit parameters.
- **R^2**. The **index of determination**, R^2, is the correlation coefficient R to the power 2 and shows the goodness of the curve fit; the greater the R^2, the better the **goodness of the fit** is.

3.2.8.10 Cut-Off...

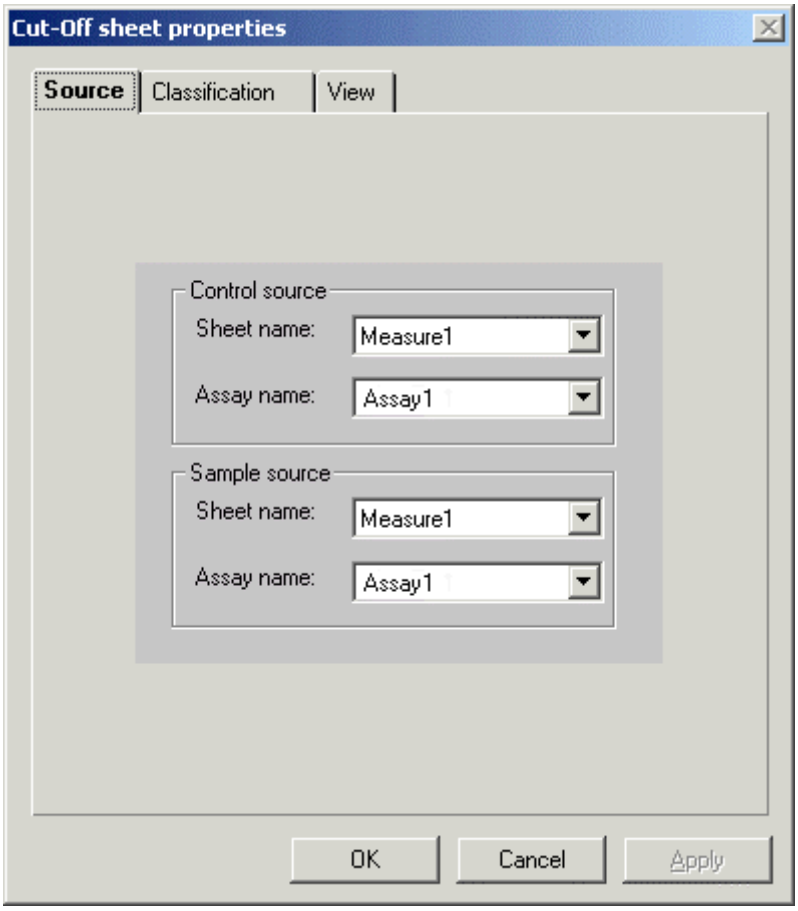
Cut-Off... (Process menu)

In the **Properties** dialog you can give the parameters for the sheet.

The colors of the names of the specimen in the Cut-Off sheets are the same as the defined colors of the different well types, i.e. calibrators, controls, blanks and samples (see Section **Setup|Colors** in the **Procedure Desktop** part of the manual).

Note: Any modification in the sheet properties will erase user modifications and any added information. However, added information stays in the two comment columns in the list and the comment wells at the top of the page, wells H3 – H6. Refer to Section **Curve Fit|View**, item **Concentration list**, in the **Results Desktop** part of the manual for example.

3.2.8.10.1 Source



Displays the available data sheets from which the source sheet can be selected.

Control source. Specifies the source sheet and the assay name for the control source.

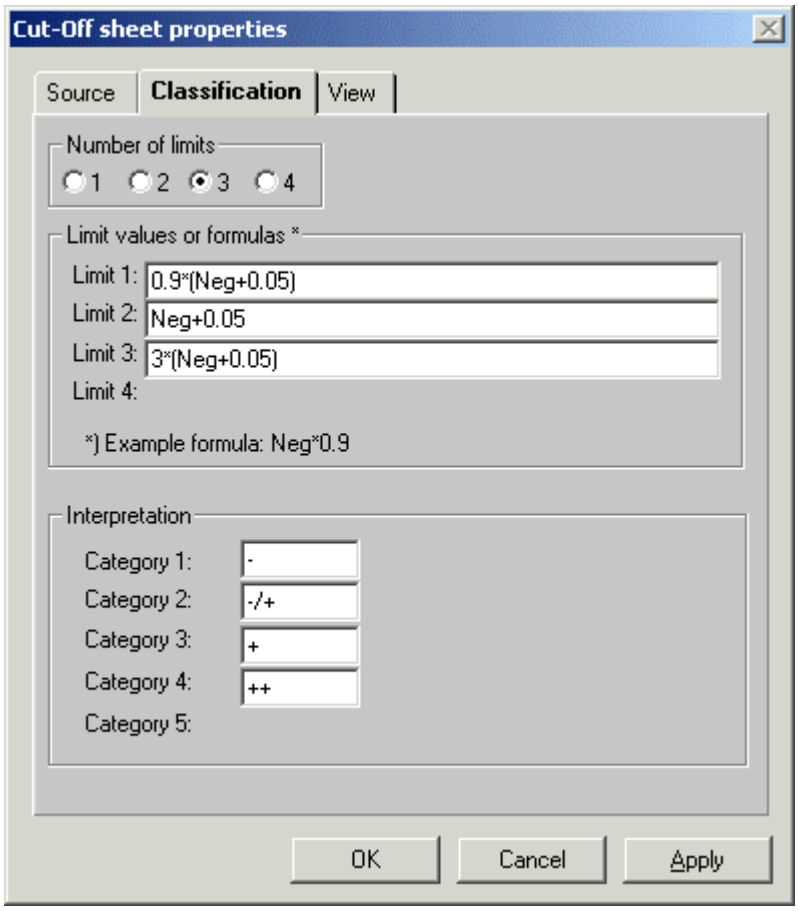
- **Sheet name.** Specifies the name of the source sheet for the controls.
- **Assay name.** Specifies the assay name for the control source.

Sample source. Specifies the source sheet and the assay name for the sample source.

- **Sheet name.** Specifies the name of the source sheet for the sample source.

- **Assay name.** Specifies the assay name for the sample source.

3.2.8.10.2 Classification



- **Number of limits.** This tells the number of limits used.

- **Limit values or formulas**. Contains defined limit values or formulas to calculate the cut-off. Controls and calibrators defined in the plate layout can be used in the limit formulas. The name must be written exactly as in the layout. In case of replicates, the mean of the replicates is used in the calculations.

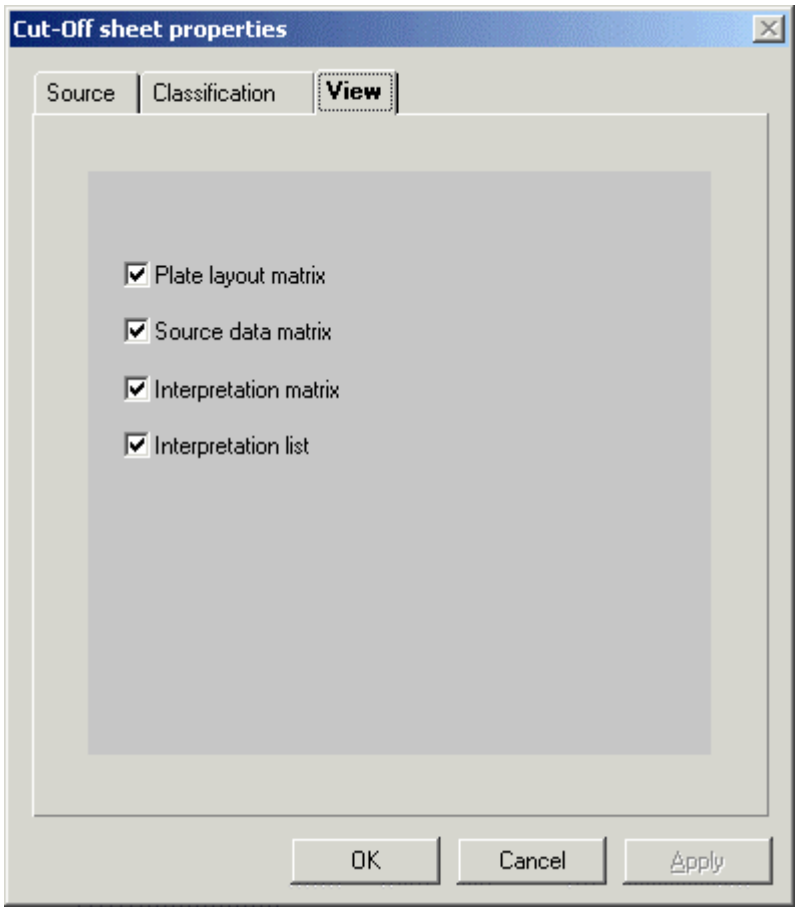
Note: It is important to update formulas if the controls used in the respective formulas are removed, deleted or all replicates disabled to obtain the correct limit values.

Interpretation

- **Categories**. Add text strings that will be displayed for the Cut-Off result categories in the interpretation matrix and interpretation list.

3.2.8.10.3 View

The user can select the items shown on the screen and printout in the View tab. The report consists of everything that has been carried out. The Cut-Off sheet can be used as a report sheet and in the View tab different layout options can be selected.



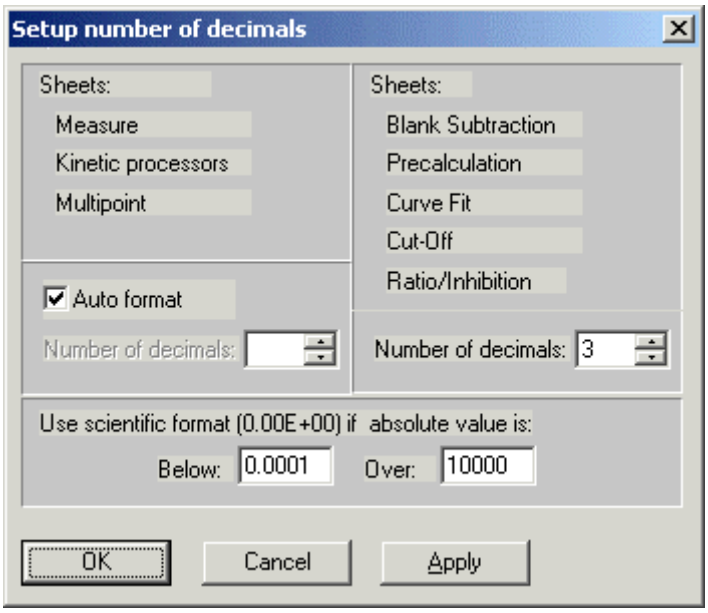
- **Plate layout matrix.** Adds a layout map with defined names.
- **Source data matrix.** Adds a source data matrix to the Cut-Off sheet.
- **Interpretation matrix.** Adds an interpretation matrix to the Cut-Off sheet.
- **Interpretation list.** Adds an interpretation list to the Cut-Off sheet.

3.2.9 Setup

3.2.9.1 Number...

Number... (Setup menu)

Use this command to change the number of decimals in the different sheets.



- **Sheets.** The number of decimals in the **Measure**, **Kinetic Processors** and **Multipoint** sheets can be changed either through the **Auto format** check box or the **Number of decimals** edit field on the left.

  The number of decimals in the **Blank Subtraction**, **Precalculation**, **Ratio/Inhibition**, **Curve Fit** and **Cut-Off** sheets can only be changed in the **Number of decimals** edit field on the right.

- **Auto format**. The settings for the automatic formatting of decimals affect only measurement data, i.e. RFU or RLU. They do not, however, affect any other number formats. If the **Auto format** is ticked, the following rules apply:

  Auto

- Result	< 1	4 decimals
- Result	< 10	3 decimals
- Result	< 100	2 decimals
- Result	< 1000	1 decimal
- Result	≥ 1000	0 decimals

- **Number of decimals**. The **Number of decimals** can range from 1 to 8. There are two **Number of decimals** edit fields belonging to different sheet types in the dialog.
- **Use scientific format (0.00E+00) if absolute value is**: Numbers outside the defined range will be shown using exponential presentation in the sheets.

The operation buttons are:

- **OK**. Applies the selected decimal format(s) to the sheets, updates the default decimal format(s) and then closes the dialog.
- **Cancel**. Cancels the dialog.
- **Apply**. Applies the selected decimal format(s) to the sheets and updates the default decimal format(s).

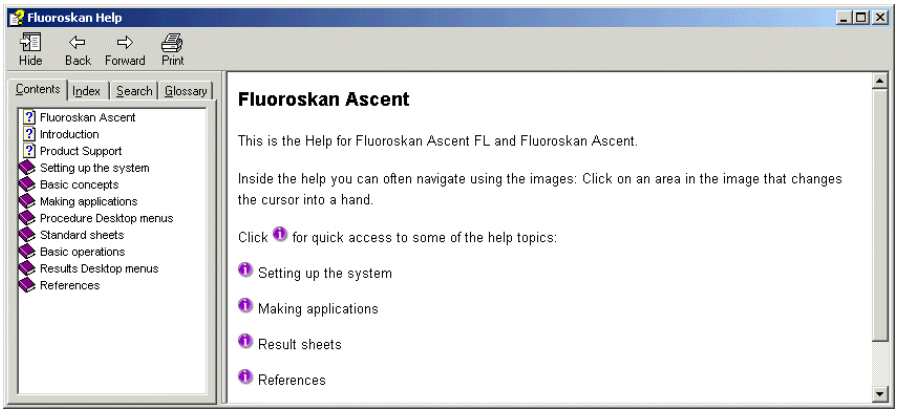
The default decimal format is pre-set in Ascent Software and varies according to the instrument used (see following table).

Instrument	Number of decimals (left edit field)	Number of decimals (right edit field)
Fluoroskan Ascent	Auto	3
Fluoroskan Ascent FL	Auto	3
Fluoroskan Ascent CF	Auto	3
Luminoskan Ascent	Auto	3

3.2.10 Help

You can launch the Help application by selecting **Help** → **Help Contents** from the main menu.

The following **Help** window will appear.



The Help main menu buttons are:

- **Hide**. Hides the left-hand side navigation window. To display the navigation window again, click the **Show** button that appears instead of the **Hide** button.

- **Back**. Takes you back to the previous view in your view history.

- **Forward**. Takes you to the next view in your view history.

- **Print**. Prints a single topic or multiple topics.

You can access the help content in three different ways by selecting one of the following tabs:

- **Contents**. Browse the help topics by subject.

- **Index**. Type in a keyword or browse all keywords to find a specific topic.

- **Search**. Find a specific help topic by entering words to search in the help content.

Note: Many images in the help application contain links to topics. When you see an image, move the cursor across the image to find the links.

4 Reference

4.1 Keyboard guide

4.1.1 General keys

The tables in this section list the keyboard commands you can use when working in a desktop environment. The following table lists action keys which allow you to use menus, select items, enter and delete data.

Menus

Key	Description
ALT/ F10	Activates the menu bar.
ALT+underlined character in the menu name	Selects a menu.
An arrow key+ENTER	Selects a menu command.
ALT+SPACEBAR	Opens the Control menu.
Underlined character in menu	Executes the menu command.

4.1.2 Dialogs and text lines

Key	Description
ENTER	Carries out a command.
ALT+up/down arrow	Opens or closes a selected list.
Escape/ALT+F4	Cancels a dialog.
An arrow key	Moves between menu commands, characters in a text box or items in a list.
TAB/SHIFT+TAB	Moves to the next or previous dialog box item.
CTRL+an arrow key	Moves one word right or left in a text box.
HOME / END	Moves to the beginning or end of a line or list.
BACKSPACE / DEL	Deletes the character to the left or right or deletes a selected text.
CTRL+C	Copies a selected text to the Clipboard.
CTRL+X	Moves a selected text to the Clipboard.
CTRL+V	Pastes a text from the Clipboard.
CTRL+Z / ALT+BACKSPACE	Undoes the last editing action.

4.1.3 Worksheet keys

The tables in this section list the keyboard commands you can use when working in a worksheet at run time. The following table lists the action keys that allow you to enter data, move the active cell within a selected range and recalculate the worksheet.

Key	Description
ENTER	When in the edit mode, it accepts the current entry. When a range is selected, it accepts the current entry and moves the active cell vertically to the next cell in the selection.
SHIFT+ENTER	When in the edit mode, it accepts the current entry. When a range is selected, it accepts the current entry and moves the active cell vertically to the previous cell in the selection.
TAB	When in the edit mode, it accepts the current entry. When a range is selected, it accepts the current entry and moves the active cell horizontally to the next cell in the selection.
SHIFT+TAB	When in the edit mode, it accepts the current entry. When a range is selected, it accepts the current entry and moves the active cell horizontally to the previous cell in the selection.
F2	Enters the edit mode. While in the editing mode, F2 displays the Cell Text dialog box, in which you can key in data and wrap it onto several lines.
F9	Recalculates a worksheet.
DEL	Clears the current selection or deletes the current record.
Escape	Cancels the current data entry or editing operation. If you are not editing and are currently in a database row, it refreshes the current database row.

The following table lists the movement keys that allow you to move the active cell within a worksheet and display different sections of the worksheet.

Key	Description
Up Arrow	Moves the active cell one row up.
Down Arrow	Moves the active cell one row down.
Left Arrow	Moves the active cell one column left.
Right Arrow	Moves the active cell one column right.
CTRL Up/Down/Left/ Right	Moves to the next range of cells containing data. If there is no additional data in the direction in which you are moving, it moves to the edge of the worksheet.
Page Up	Moves one screen up.
Page Down	Moves one screen down.
CTRL Page Up	Moves one screen left.
CTRL Page Down	Moves one screen right.
Home	Goes to the first column of the current row.
End	Goes to the last column of the current row that contains data.
CTRL Home	Goes to row 1 column 1.
CTRL End	Goes to the last row and column that contains data.

The following table lists the keys that modify the action of the movement keys.

Key	Description
Scroll lock	Causes the worksheet window to scroll without changing the current selection with all the movement keys except Home, End, CTRL Home and CTRL End.
SHIFT plus any movement key	Extends the current selection.

4.2 Calculations

4.2.1 Mathematical operators

The following table shows typical mathematical operators used.

+ or - (unary)

* or /

+ or -

= < > <= >= <>

#not#(unary)

#and# #or#

4.2.2 A-Z worksheet function reference

This chapter provides a complete alphabetical reference to the worksheet functions. Refer to Built-In Worksheet Functions for additional information on how to use the worksheet functions.

ABS
ACOS
ACOSH
ADDRESS
AND
ASIN
ASINH
ATAN
ATAN2
ATANH
AVERAGE
CEILING
CHAR
CHOOSE
CLEAN
CODE
COLUMN
COLUMNS
COS
COSH
COUNT
COUNTA
DATE
DATEVALUE
DAY
ERROR.TYPE
EVEN
EXACT
EXP
FACT
FALSE
FIND
FIXED
FLOOR
HLOOKUP
HOUR
IF
INDEX
INDIRECT
INT
ISBLANK
ISERR
ISERROR
ISLOGICAL
ISNA
ISNONTEXT
ISNUMBER
ISREF
ISTEXT
LEFT
LEN
LN
LOG
LOG10
LOOKUP
LOWER
MATCH
MAX
MIDX
MIN
MINUTE
MOD
MONTH
N
NA
NOT
NOW
ODD
OFFSET
OR
PI
PRODUCT
PROPER
RAND
REPLACE
REPT
RIGHT
ROUND
ROW
ROWS
SEARCH
SECOND
SIGN
SIN
SINH
SQRTX
STDEV
STDEVP
SUBSTITUTE
SUM
SUMSQ
T
TAN
TANH
TEXT
TIME
TIMEVALUE
TODAY
TRIM
TRUE
TRUNC
TYPE
UPPER
VALUE
VAR
VARP
VLOOKUP
WEEKDAY
YEAR

4.2.2.1 ABS

Description Returns the absolute value of a number.

Syntax **ABS**(*number*)

The *number* is any integer.

Remarks An absolute value does not display a positive or negative sign.

See Also **SIGN** function

Examples `ABS(-1)` returns 1

`ABS(1)` returns 1

4.2.2.2 ACOS

Description Returns the arccosine of a number.

Syntax **ACOS**(*number*)

The *number* is the cosine of the angle. The cosine can range from 1 to -1.

Remarks The resulting angle is returned in radians (from 0 to π).

See Also **COS** and **PI** functions

Examples `ACOS(.5)` returns 1.05

`ACOS(-.2)` returns 1.77

4.2.2.3 ACOSH

Description Returns the inverse hyperbolic cosine of a number.

Syntax **ACOSH**(*number*)

The *number* is any number equal to or greater than 1.

See Also **ASINH**, **ATANH** and **COSH** functions

Examples `ACOSH(1.2)` returns .62

`ACOSH`(3) returns 1.76

4.2.2.4 ADDRESS

Description Creates a cell address as text.

Syntax **ADDRESS**(*row*, *column*, *ref_type* [, *a1*] [, *sheet*])

The *row* is the row number for the cell. The address*column* is the column number for the cell address.

The *ref_type* is the cell reference type. The following table lists the values for this argument.

Argument	Reference type
1	Absolute
2	Absolute row, relative column
3	Relative row, absolute column
4	Relative

The *a1* is the reference format. This argument must be TRUE() to represent an A1 reference format. Formula One does not support the

R1C1 reference format.

The *sheet* is the name of an external spreadsheet. Omitting this argument assumes that the reference exists on the current spreadsheet.

See Also **COLUMN**, **OFFSET** and **ROW** functions

Examples `ADDRESS(5, 6, 1)` returns "F5"

`ADDRESS(5, 6, 4, TRUE(), "STEPS.VTS")` returns "STEPS.VTS!F5"

4.2.2.5 AND

Description Returns True if all arguments are true. Returns False if at least one argument is false.

Syntax **AND**(*logical_list*)

The *logical_list* is a list of conditions separated by commas. You can include as many as 30 conditions in the list. The list can contain logical values or a reference to a range containing logical values. Text and empty cells are ignored. If there are no logical values on the list, the #VALUE! is returned.

See Also **IF** , **NOT** and **OR** functions

Examples `AND(1+1=2, 5+5=10)` returns True, because both arguments are true.

`AND(TRUE(), FALSE())` returns False

4.2.2.6 ASIN

Description Returns the arcsine of a number.

Syntax **ASIN**(*number*)

The *number* is the sine of the resulting angle ranging from -1 to 1.

Remarks The resulting angle is returned in radians (ranging from $-\pi/2$ to $\pi/2$).

See Also **ASINH**, **PI** and **SIN** functions

Examples `ASIN(-1)` returns -1.57

`ASIN(.4)` returns .41

4.2.2.7 ASINH

Description Returns the inverse hyperbolic sine of a number.

Syntax **ASINH**(*number*)

The *number* is any number.

See Also **ACOSH**, **ASIN**, **ATANH** and **SINH** functions

Examples ASINH(5.3) returns 2.37

ASINH(-4) returns -2.09

4.2.2.8 ATAN

Description Returns the arctangent of a number.

Syntax **ATAN**(*number*)

The *number* is the tangent of the angle.

Remarks The resulting angle is returned in radians ranging from $-\pi/2$ to $\pi/2$. To find the result in degrees, multiply the result by 180/PI().

See Also **ATAN2**, **ATANH**, **PI** and **TAN** functions

Examples `ATAN(3.5)` returns 1.29

`ATAN(-4)` returns -1.33

4.2.2.9 ATAN2

Description Returns the arctangent of the specified coordinates.

Syntax **ATAN2**(*x*, *y*)

x is the x coordinate.

y is the y coordinate.

Remarks The arctangent is the angle from the x-axis to a line with endpoints at the origin (0, 0) and a point with the given coordinates (x, y). The angle is returned in radians ranging from $-\pi$ to π, excluding $-\pi$.

See Also **ATAN**, **ATANH, PI** and **TAN** functions

Examples `ATAN2(3, 6)` returns 1.11

`ATAN2(-1, .1)` returns 3.04

4.2.2.10 ATANH

Description Returns the inverse hyperbolic tangent of a number.

Syntax **ATANH**(*number*)

The *number* is a number between -1 and 1, excluding -1 and 1.

See Also **ACOS**, **ASINH** and **TANH** functions

Examples `ATANH(.5)` returns .55

`ATANH(-.25)` returns -.26

4.2.2.11 AVERAGE

Description Returns the average of the supplied numbers. The result of **AVERAGE** is also known as the arithmetic mean.

Syntax **AVERAGE**(*number_list*)

The *number_list* is a list of numbers separated by commas. As many as 30 numbers can be included in the list and the list can contain numbers or a reference to a range that contains numbers. Text, logical expressions or empty cells in a referenced range are ignored. All numerical values (incl. 0) are used.

See Also **MIN** and **MAX** functions

Examples `AVERAGE(5, 6, 8, 14)` returns 8.25

`AVERAGE(C15:C17)` returns 134; C15:C17 contains 24,144, and 234

4.2.2.12 CEILING

Description Rounds up a number to the nearest multiple of a specified significance.

Syntax **CEILING**(*number*, *significance*)

The *number* is the value to round.

The *significance* is the multiple to which to round.

Remarks Regardless of the sign of the number, the value is rounded up away from zero. If the number is an exact multiple of the significance, no rounding occurs.

If the number or significance is non-numerical, the #VALUE! is returned. When the arguments have opposite signs, the #NUM! is returned.

See Also **EVEN**, **FLOOR**, **INT, ODD**, **ROUND** and **TRUNC** functions

Examples `CEILING(1.23459, .05)` returns 1.25

`CEILING(-148.24, -2)` returns -150

4.2.2.13 CHAR

Description Returns a character that corresponds to the supplied ANSI code.

Syntax **CHAR**(*number*)

The *number* is a value between 1 and 255 that specifies an ANSI character.

Remarks The character and associated numeric code are defined by Windows® in the ANSI character set.

See Also **CODE** function

Examples `CHAR(70)` returns F

`CHAR(35)` returns #

4.2.2.14 CHOOSE

Description Returns a value from a list of numbers based on the index number supplied.

Syntax **CHOOSE**(*index*, *item_list*)

The *index* is a number that refers to an item on the *item_list*.

The *index* can be a cell reference. The *index* can also be a formula that returns any value from 1 to 29.

If *index* is less than 1 or greater than the number of items on the *item_list*, the #VALUE! is returned.

If the *index* is a fractional number, it is truncated to an integer.

The *item_list* is a list of numbers, formulas or text separated by commas. This argument can also be a range reference. You can specify as

many as 29 items on the list.

See Also **INDEX** function

Examples `CHOOSE(2,"Q1", "Q2", "Q3", "Q4")` returns "Q2"

`AVERAGE(CHOOSE(1, A1:A10, B1:B10, C1:C10))` returns the average of the contents of the range A1:A10.

4.2.2.15 CLEAN

Description Removes all non-printable characters from the supplied text.

Syntax **CLEAN**(*text*)

The *text* is any worksheet information.

Remarks Text that is imported from another environment may require this function.

See Also **CHAR** and **TRIM** functions

Examples `CLEAN("Results " & CHAR(8) & "RFU")` returns the Results RFU, because the character returned by CHAR(8) is non-printable.

4.2.2.16 CODE

Description Returns a numeric code representing the first character of the supplied string.

Syntax **CODE**(*text*)

The *text* is any string.

Remarks The numeric code and associated string are defined in your computer's character set. The character set used by Windows® is the ANSI character set.

See Also **CHAR** function

Examples `CODE("A")` returns 65

`CODE("b")` returns 98

4.2.2.17 COLUMN

Description Returns the column number of the supplied reference.

Syntax **COLUMN**(*reference*)

The *reference* is a reference to a cell or range. Omitting the argument returns the number of the column in which the **COLUMN** is placed.

See Also **COLUMNS** and **ROW** functions

Examples `COLUMN(B3)` returns 2

`COLUMN()` returns 4 if the function is entered in cell D2.

4.2.2.18 COLUMNS

Description Returns the number of columns in a range reference.

Syntax **COLUMNS**(*range*)

The *range* is a reference to a range of cells.

See Also **COLUMN** and **ROWS** functions

Examples `COLUMNS(A1:D5)` returns 4

4.2.2.19 COS

Description Returns the cosine of a number.

Syntax **COS**(*number*)

The *number* is any number.

See Also **ACOS, ASINH**, **ATANH**, **COSH** and **PI** functions

Examples `COS(1.444)` returns .126

`COS(5)` returns .28

4.2.2.20 COSH

Description Returns the hyperbolic cosine of a number.

Syntax **COSH**(*number*)

The *number* is any number.

See Also **ASINH**, **ATANH** and **COS** functions

Examples `COSH(2.10)` returns 4.14

`COSH(.24)` returns 1.03

4.2.2.21 COUNT

Description Returns the number of values on the supplied list.

Syntax **COUNT**(*value_list*)

The *value_list* is a list of values. The list can contain as many as 30 values.

Remarks The **COUNT** only numerates numbers or numerical values (e.g. logical values, dates or text representations of dates). If you supply a range, only numbers and numerical values in the range are counted. Empty cells, logical values, text and error values in the range are ignored.

See Also **AVERAGE**, **COUNTA** and **SUM** functions

Examples `COUNT(5, 6, "Q2")` returns 2
`COUNT("03/06/94", "06/21/94", "10/19/94")` returns 3

4.2.2.22 COUNTA

Description Returns the number of nonblank values on the supplied list.

Syntax **COUNTA**(*expression_list*)

The *expression_list* is a list of expressions. As many as 30 expressions can be included in the list.

Remarks The **COUNTA** returns the number of cells that contain data in a range. Null values ("") are counted, but references to empty cells are ignored.

See Also **AVERAGE**, **COUNT**, **PRODUCT** and **SUM** functions

Examples `COUNTA(32,45,"Average", "")` returns 4

`COUNTA(C38:C40)` returns 0, when the specified range contains empty cells.

4.2.2.23 DATE

Description Returns the serial number of the supplied date.

Syntax **DATE**(*year*, *month*, *day*)

The *year* is a number ranging from 1900 to 2078. If the year is between 1920 and 2019, you can specify two digits to represent the year. Otherwise specify all four digits.

The *month* is a number representing the month (e.g. 12 represents December). If a number greater than 12 is supplied, the number is added to the first month of the specified year.

The *day* is a number representing the day of the month. If the number you specify for the day exceeds the number of days in that particular month, the number is added to the first day of the specified month.

See Also **DATEVALUE**, **DAY**, **MONTH**, **NOW**, **TIMEVALUE**, **TODAY** and **YEAR** functions

Examples `DATE(94, 6, 21)` returns 34506

`DATE(99, 3, 6)` returns 36225

4.2.2.24 DATEVALUE

Description Returns the serial number of a date supplied as a text string.

Syntax **DATEVALUE**(*text*)

The *text* is a date in text format between January 1, 1900 and December 31, 2078. If you omit the year, the current year is used.

See Also **NOW**, **TIMEVALUE** and **TODAY** functions

Examples `DATEVALUE("3/6/94")` returns 34399

`DATEVALUE("12/25/95")` returns 35058

4.2.2.25 DAY

Description Returns the day of the month that corresponds to the date represented by the supplied number.

Syntax **DAY**(*serial_number*)

The *serial_number* is a date represented as a serial number or as text (e.g. "06-21-94" or "21-Jun-94").

See Also **HOUR**, **MINUTE**, **MONTH**, **NOW, SECOND**, **TODAY**, **WEEKDAY** and **YEAR** functions

Examples `DAY(34399)` returns 6

`DAY("06-21-94")` returns 21

4.2.2.26 ERROR.TYPE

Description Returns a number corresponding to an error.

Syntax **ERROR.TYPE**(*error_ref*)

The *error_ref* is a cell reference.

Remarks The following table lists the error text and associated error numbers returned by this function.

Number	Error text
1	#NULL!
2	#DIV/0!
3	#VALUE!
4	#REF!
5	#NAME?
6	#NUM!
7	#N/A
#N/A	Other

See Also **ISERR** and **ISERROR** functions

Examples `ERROR.TYPE(A1)` returns 2 if the formula in cell A1 attempts to divide by zero.

4.2.2.27 EVEN

Description Rounds the specified number up to the nearest even integer.

Syntax **EVEN**(*number*)

The *number* is any number, a formula that evaluates to a number or a reference to a cell that contains a number.

See Also **CEILING**, **FLOOR**, **INT**, **ODD**, **ROUND** and **TRUNC** functions

Examples `EVEN(2.5)` returns 4

`EVEN(2030.45)` returns 2032

4.2.2.28 EXACT

Description Compares two expressions for identical, case-sensitive matches. True is returned if the expressions are identical. False is returned if they are not identical.

Syntax **EXACT**(*expression1*, *expression2*)

The *expression1* is any text.

The *expression2* is any text.

See Also **LEN** and **SEARCH** functions

Examples `EXACT("Match", "Match")` returns True

`EXACT("Match", "match")` returns False

4.2.2.29 EXP

Description Returns e raised to the specified power. The constant e is 2.71828182845904 (the base of the natural logarithm).

Syntax **EXP**(*number*)

The *number* is any number expressed as the exponent.

See Also **LN** and **LOG** functions

Examples `EXP(2.5)` returns 12.18

`EXP(3)` returns 20.09

4.2.2.30 FACT

Description Returns the factorial of a specified number.

Syntax **FACT**(*number*)

The *number* is any non-negative integer. If you supply a real number, the **FACT** truncates the number to an integer before calculation.

See Also **PRODUCT** function

Examples `FACT(2.5)` returns 2

`FACT(6)` returns 720

4.2.2.31 FALSE

Description Returns the logical value False. This function always requires the trailing parentheses.

Syntax **FALSE**()

See Also **TRUE** function

4.2.2.32 FIND

Description Searches for a string of text within another text string and returns the character position at which the search string first occurs.

Syntax **FIND**(*search_text*, *text* [, *start_position*])

The *search_text* is the text to find. If you specify an empty string (""), the **FIND** matches the first character in the text.

The *text* is the text to be searched.

The *start_position* is the character position in the text, where the search begins. The first character in the text is character number 1. When you omit this argument, the default starting position is character number 1.

Remarks The **FIND** is case-sensitive. You cannot use wild card characters in the *search_text*.

See Also **EXACT**, **LEN**, **MID** and **SEARCH** functions

Examples `FIND("Em", "Ex=320 Em=405")` returns 8

`FIND("=", "Ex=320 Em=405",4)` returns 10

4.2.2.33 FIXED

Description Rounds a number to the supplied precision, formats the number into decimal format and returns the result as text.

Syntax **FIXED**(*number* [, *precision*][, *no_commas*])

number is any number.

The *precision* is the number of digits that appear to the right of the decimal place. When this argument is omitted, a default precision of 2 is used. If you specify a negative precision, the number is rounded to the left of the decimal point. You can specify a precision with as many as 127 digits.

The *no_commas* determines if thousands separators (commas) are used in the result. Use 1 to exclude commas in the result. If the *no_commas* is 0 or the argument is omitted, the thousands separators are included (e.g. 1,000.00).

See Also **ROUND**, **TEXT** and **VALUE** functions

Examples `FIXED(2000.5, 3)` returns "2,000.500"

`FIXED(2009.5, -1, 1)` returns "2010"

4.2.2.34 FLOOR

Description Rounds a number down to the nearest multiple of a specified significance.

Syntax **FLOOR**(*number*, *significance*)

The *number* is the value to round.

The *significance* is the multiple to which to round.

Remarks Regardless of the sign of the number, the value is rounded down towards zero. If the number is an exact multiple of the significance, no rounding occurs.

If the number or significance is non-numerical, the #NAME? is returned. When the arguments have opposite signs, the #NUM! is returned.

See Also **CEILING**, **EVEN**, **INT**, **ODD**, **ROUND** and **TRUNC** functions

Examples `FLOOR(1.23459, .05)` returns 1.2

`FLOOR(-148.24, -2)` returns -148

4.2.2.35 HLOOKUP

Description Searches the top row of a table for a value and returns the contents of a cell in the table that corresponds to the location of the search value.

Syntax **HLOOKUP**(*search_item*, *search_range*, *row_index*)

The *search_item* is a value, text string or reference to a cell containing a value that is matched against data in the top row of the

search_range.

The *search_range* is a reference to the range (table) to be searched. The cells in the first row of the *search_range* can contain numbers, text or logical values. The contents of the first row must be in ascending order (e.g. -2, -1, 0, 2...A through Z, False, True). Text searches are not case-sensitive.

The *row_index* is the row in the *search_range* from which the matching value is returned.

The *row_index* can be a number from 1 to the number of rows in the *search_range*.

If the *row_index* is less than 1, the #VALUE! is returned.

When the *row_index* is greater than the number of rows in the table, the #REF! is returned.

Remarks

The **HLOOKUP** compares the information in the top row of the *search_range* to the supplied *search_item*. When a match is found, information located in the same column and supplied row (*row_index*) is returned.

If the *search_item* cannot be found in the top row of the *search_range*, the largest value that is less than the *search_item* is used. When the *search_item* is less than the smallest value in the first row of the *search_range*, the #REF! is returned.

See Also

INDEX, **LOOKUP**, **MATCH** and **VLOOKUP** functions

4.2.2.36 HOUR

Description Returns the hour component of the specified time in a 24-hour format.

Syntax **HOUR**(*serial_number*)

The *serial_number* is the time expressed as a serial number. The decimal portion of the number represents the time as a fraction of the day.

Remarks The result is an integer ranging from 0 (12:00 AM) to 23 (11:00 PM).

See Also **DAY**, **MINUTE**, **MONTH**, **NOW**, **SECOND**, **WEEKDAY** and **YEAR** functions

Examples `HOUR(34259.4)` returns 9

`HOUR(34619.976)` returns 23

4.2.2.37 IF

Description Tests the condition and returns the specified value.

Syntax **IF**(*condition*, *true_value*, *false_value*)

The *condition* is any logical expression.

The *true_value* is the value to be returned if the condition evaluates to True.

The *false_value* is the value to be returned if the condition evaluates to False.

See Also **AND**, **FALSE**, **NOT**, **OR** and **TRUE** functions

Examples `IF(A1>10, "Greater", "Less")` returns Greater if the contents of A1 is greater than 10 and Less if the contents of A1 is less than 10.

4.2.2.38 INDEX

Description Returns the contents of a cell from a specified range.

Syntax **INDEX**(*reference* [, *row*] [, *column*] [, *range_number*])

The *reference* is a reference to one or more ranges.

If the *reference* specifies more than one range, separate each reference with a comma and enclose the *reference* in parentheses (e.g. (A1:C6, B7:E14, F4)).

If each range in the *reference* contains only one row or column, you can omit the row or column argument. For example, if the *reference* is A1:A15, you can omit the column argument (e.g. INDEX(A1:A15, 3,, 1)).

The *row* is the row number in the *reference* from which to return data.

The *column* is the column number in the *reference* from which to return data.

The *range_number* specifies the range from which the data is returned if the *reference* contains more than one range. For example, if the *reference* is (A1:A10, B1:B5, D14:E23), then A1:A10 is the *range_number* 1, B1:B5 the *range_number* 2 and D14:E23 the *range_number* 3.

Remarks If the *row*, *column* and *range_number* do not point to a cell within the reference, the #REF! is returned. If the *row* and *column* are omitted, the **INDEX** returns the range in the reference specified by the *range_number*.

See Also **CHOOSE**, **HLOOKUP**, **LOOKUP**, **MATCH** and **VLOOKUP** functions

4.2.2.39 INDIRECT

Description Returns the contents of the cell referenced by the specified cell.

Syntax **INDIRECT**(*ref_text* [, *a1*])

The *ref_text* is a reference to a cell that references a third cell. If the *ref_text* is not a valid reference, the #REF! is returned.

The *a1* is the reference format. This argument must be TRUE() to represent an A1 reference format. Formula One does not support the R1C1 reference format.

See Also **OFFSET** function

Examples `INDIRECT(C1)` returns the contents of the cell that C1 references. If C1 contains "D1", the contents of D1 is returned by INDIRECT.

4.2.2.40 INT

Description Rounds the supplied number down to the nearest integer.

Syntax **INT**(*number*)

The *number* is any real number.

See Also **CEILING**, **FLOOR**, **MOD**, **ROUND** and **TRUNC** functions

Examples `INT(10.99)` returns 10

`INT(-10.99)` returns -11

4.2.2.41 ISBLANK

Description Determines if the specified cell is blank.

Syntax **ISBLANK**(*reference*)

The *reference* is a reference to any cell.

Remarks If the referenced cell is blank, True is returned. False is returned if the cell is not blank.

See Also **ISERR**, **ISERROR**, **ISLOGICAL**, **ISNA**, **ISNONTEXT**, **ISNUMBER**, **ISREF** and **ISTEXT** functions

Examples `ISBLANK(A1)` returns True if A1 is a blank cell.

4.2.2.42 ISERR

Description Determines if the specified expression returns an error value.

Syntax **ISERR**(*expression*)

The *expression* is any expression.

Remarks If the *expression* returns any error except the #N/A!, True is returned. Otherwise False is returned.

See Also **ISBLANK**, **ISERROR**, **ISLOGICAL**, **ISNA**, **ISNONTEXT**, **ISNUMBER**, **ISREF** and **ISTEXT** functions

Examples `ISERR(A1)` returns True if A1 contains a formula that returns an error (e.g. #NUM!).

4.2.2.43 ISERROR

Description Determines if the specified expression returns an error value.

Syntax **ISERROR**(*expression*)

The *expression* is any expression.

Remarks If the *expression* returns any error value (e.g. #N/A!, #VALUE!, #REF!, #DIV/0!, #NUM!, #NAME? or #NULL!), True is returned. Otherwise False is returned.

See Also **ISBLANK**, **ISERR**, **ISLOGICAL**, **ISNA**, **ISNONTEXT**, **ISNUMBER**, **ISREF** and **ISTEXT** functions

Examples `ISERROR(4/0)` returns True

`ISERROR(A1)` returns False if A1 contains a formula that does not return an error.

4.2.2.44 ISLOGICAL

Description Determines if the specified expression returns a logical value.

Syntax **ISLOGICAL**(*expression*)

The *expression* is any expression.

Remarks If the expression returns a logical value, True is returned. Otherwise False is returned.

See Also **ISBLANK**, **ISERR**, **ISERROR**, **ISNA**, **ISNONTEXT**, **ISNUMBER**, **ISREF** and **ISTEXT** functions

Examples `ISLOGICAL(ISBLANK(A1))` returns True, because ISBLANK returns a logical value.

4.2.2.45 ISNA

Description Determines if the specified expression returns the value "not available" error.

Syntax **ISNA**(*expression*)

The *expression* is any expression.

Remarks If the *expression* returns the #N/A! error, True is returned. Otherwise False is returned.

See Also **ISBLANK**, **ISERR**, **ISERROR**, **ISLOGICAL**, **ISNONTEXT**, **ISNUMBER**, **ISREF** and **ISTEXT** functions

Examples `ISNA(A1)` returns True if cell A1 contains the NA() function or returns the error value #N/A!.

4.2.2.46 ISNONTEXT

Description Determines if the specified expression is not a text.

Syntax **ISNONTEXT**(*expression*)

The *expression* is any expression.

Remarks If the *expression* returns any value that is not a text, True is returned. Otherwise False is returned.

See Also **ISBLANK**, **ISERR**, **ISERROR**, **ISLOGICAL**, **ISNA**, **ISNUMBER**, **ISREF** and **ISTEXT** functions

Examples `ISNONTEXT(F3)` returns True if cell F3 contains a number or is a blank cell.

`ISNONTEXT("text")` returns False.

4.2.2.47 ISNUMBER

Description Determines if the specified expression is a number.

Syntax **ISNUMBER**(*expression*)

The *expression* is any expression.

Remarks If the *expression* returns a number, True is returned. Otherwise False is returned. If the *expression* returns a number represented as text (e.g. "12"), False is returned.

See Also **ISBLANK**, **ISERR**, **ISERROR**, **ISLOGICAL**, **ISNA**, **ISNONTEXT**, **ISREF** and **ISTEXT** functions

Examples `ISNUMBER(123.45)` returns True

`ISNUMBER("123")` returns False

4.2.2.48 ISREF

Description Determines if the specified expression is a range reference.

Syntax **ISREF**(*expression*)

The *expression* is any expression.

Remarks If the *expression* returns a range reference, True is returned. Otherwise False is returned.

See Also **ISBLANK**, **ISERR**, **ISERROR**, **ISLOGICAL**, **ISNA**, **ISNONTEXT**, **ISNUMBER** and **ISTEXT** functions

Examples `ISREF(A3)` returns True

4.2.2.49 ISTEXT

Description Determines if the specified expression is text.

Syntax **ISTEXT**(*expression*)

The *expression* is any expression.

Remarks If the *expression* returns text, True is returned. Otherwise False is returned.

See Also **ISBLANK**, **ISERR**, **ISERROR**, **ISLOGICAL**, **ISNA**, **ISNONTEXT**, **ISNUMBER** and **ISREF** functions

Examples `ISTEXT("2nd Blank")` returns True

4.2.2.50 LEFT

Description Returns the characters furthest left from the specified text string.

Syntax **LEFT**(*text* [, *num_chars*])

The *text* is any text string.

The *num_chars* is the number of characters to return. This value must be greater than or equal to zero. If the *num_chars* is greater than the number of characters in the *text*, the entire string is returned. Omitting this argument assumes a value of 1.

See Also **MID** and **RIGHT** functions

Examples `LEFT("2nd Sample")` returns "2"

`LEFT("2nd Control", 3)` returns "2nd"

4.2.2.51 LEN

Description Returns the number of characters in the supplied text string.

Syntax **LEN**(*text*)

The *text* in any text string. The spaces in the string are counted as characters.

See Also **EXACT** and **SEARCH** functions

Examples `LEN("3rd Control")` returns 11

`LEN("1-3")` returns 3

4.2.2.52 LN

Description Returns the natural logarithm (based on the constant e) of a number.

Syntax **LN**(*number*)

The *number* is any positive real number.

Remarks The **LN** is the inverse of the **EXP** function.

See Also **EXP**, **LOG** and **LOG10** functions

Examples `LN(12.18)` returns 2.50

`LN(20.09)` returns 3.00

4.2.2.53 LOG

Description Returns the logarithm of a number to the specified base.

Syntax **LOG**(*number* [, *base*])

The *text* is any positive real number.

The *base* is the base of the logarithm. Omitting this argument assumes a base of 10.

See Also **EXP**, **LN** and **LOG10** functions

Examples `LOG(1)` returns 0

`LOG(10)` returns 1

4.2.2.54 LOG10

Description Returns the base 10 logarithm of a number.

Syntax **LOG10**(*number*)

The *number* is any positive real number.

See Also **EXP**, **LN** and **LOG** functions

Examples `LOG10(260)` returns 2.41

`LOG10(100)` returns 2

4.2.2.55 LOOKUP

Description Searches for a value in one range and returns the contents of the corresponding position to a second range.

Syntax **LOOKUP**(*lookup_value*, *lookup_range*, *result_range*)

The *lookup_value* is the value for which to search in the first range.

The *lookup_range* is the first range to search and contains only one row or one column.

The range can contain numbers, text or logical values.

To search for the *lookup_range* correctly, the expressions in the range have to be placed in ascending order (e.g. -2, -1, 0, 1, 2...A through Z, False, True). The search is not case-sensitive.

The *result_range* is a range consisting of one row or one column that is of the same size as the *lookup_range*.

Remarks If the *lookup_value* does not have an exact match in the *lookup_range*, the largest value that is less than or equal to the *lookup_value* is found and the corresponding position in the *result_range* is returned. When the *lookup_value* is smaller than the data in the *lookup_range*, the #N/A is returned.

See Also **HLOOKUP**, **INDEX** and **VLOOKUP** functions

4.2.2.56 LOWER

Description Changes the characters in the specified string to lowercase characters. Numerical characters in the string are not changed.

Syntax **LOWER**(*text*)

The *text* is any string.

See Also **PROPER** and **UPPER** functions

Examples `LOWER("3rd Sample")` returns "3rd sample"

`LOWER("JOHN DOE")` returns "john doe"

4.2.2.57 MATCH

Description A specified value is compared to values in a range. The position of the matching value in the search range is returned.

Syntax **MATCH**(*lookup_value*, *lookup_range*, *comparison*)

The *lookup_value* is the value to compare to. It can be a number, text or logical value or a reference to a cell that contains one of those values.

The *lookup_range* is the range to search and contains only one row or one column. The range can contain numbers, text or logical values.

The *comparison* is a number that represents the type of comparison to be made between the *lookup_value* and the values in the *lookup_range*. When you omit this argument, the comparison method 1 is assumed.

When the comparison is 1, the largest value that is less than or equal to the *lookup_value*

is matched. When using this comparison method, the values in the *lookup_range* have to be in ascending order (e.g. ...-2, -1, 0, 1, 2..., A through Z, False, True).

When the comparison is 0, the first value that is equal to the *lookup_value* is matched. When using this comparison method, the values in the *lookup_range* can be in any order.

When the comparison is -1, the smallest value that is greater than or equal to the *lookup_value* is matched. When using this comparison method, the values in the *lookup_range* have to be in descending order (e.g. True, False, Z through A, ...2, 1, 0, -1, -2...).

Remarks When the comparison method 0 is used and the *lookup_value* is text, the *lookup_value* can contain wild card characters. The wild card characters are * (an asterisk), which matches any sequence of characters and ? (a question mark), which matches any single character.

When no match is found for the *lookup_value*, the #N/A is returned.

See Also **HLOOKUP**, **INDEX**, **LOOKUP** and **VLOOKUP** functions

4.2.2.58 MAX

Description Returns the largest value on the specified list of numbers.

Syntax **MAX**(*number_list*)

The *number_list* is a list of as many as 30 numbers separated by commas.

The list can contain numbers, logical values, text representations of numbers or a reference to a range containing those values.

Error values or text that cannot be translated into numbers return errors.

If a range reference is included in the list, text, logical expressions and empty cells in the range are ignored.

If there are no numbers on the list, 0 is returned.

See Also **AVERAGE** and **MIN** functions

Examples `MAX(50, 100, 150, 500, 200)` returns 500

`MAX(A1:F12)` returns the largest value in the range.

4.2.2.59 MID

Description Returns the specified number of characters from a text string, beginning with the specified starting position.

Syntax **MID**(*text*, *start_position*, *num_chars*)

The *text* is the string from which to return characters.

The *start_position* is the position of the first

character to return from the text.

If the *start_position* is 1, the first character in the text is returned.

If the *start_position* is greater than the number of characters in the text, an empty string ("") is returned.

If the *start_position* is less than 1, the #VALUE! is returned.

The *num_chars* is the number of characters to return. If the *num_chars* is negative, the #VALUE! is returned.

Remarks If the *start_position* plus the number of characters in the *num_chars* exceed the length of the text, the characters from the *start_position* to the end of the text are returned.

See Also **CODE**, **FIND**, **LEFT**, **RIGHT** and **SEARCH** functions

Examples `MID("Labsystems COMBIPLATE ", 12, 10)` returns "COMBIPLATE"

`MID("Dispenser 2 speed (1..100%):", 11, 1)` returns 2

4.2.2.60 MIN

Description Returns the smallest value on the specified list of numbers.

Syntax **MIN**(*number_list*)

The *number_list* is a list of as many as 30 numbers separated by commas.

The list can contain numbers, logical values, text representations of numbers or a reference to a range containing those values.

Error values or text that cannot be translated into numbers return errors.

If a range reference is included in the list, text, logical expressions and empty cells in the range are ignored.

If there are no numbers on the list, 0 is returned.

See Also **AVERAGE** and **MAX** functions

Examples `MIN(50, 100, 150, 500, 200)` returns 50

`MIN(A1:F12)` returns the smallest value in the range.

4.2.2.61 MINUTE

Description Returns the minute that corresponds to the supplied date.

Syntax **MINUTE**(*serial_number*)

The *serial_number* is the time expressed as a serial number. The decimal portion of the number represents the time as a fraction of the day.

Remarks The result is an integer ranging from 0 to 59.

See Also **DAY**, **HOUR**, **MONTH**, **NOW**, **SECOND**, **WEEKDAY** and **YEAR** functions

Examples `MINUTE(34506.4)` returns 36

`MINUTE(34399.825)` returns 48

4.2.2.62 MOD

Description Returns the remainder after dividing a number with a specified divisor.

Syntax **MOD**(*number*, *divisor*)

The *number* is any number.

The *divisor* is any non-zero number. If the *divisor* is 0, the #DIV/0! is returned.

See Also **INT**, **ROUND** and **TRUNC** functions

Examples `MOD(-23, 3)` returns 1

`MOD(-23, -3)` returns -2

4.2.2.63 MONTH

Description Returns the month that corresponds to the supplied date.

Syntax **MONTH**(*serial_number*)

The *serial_number* is the date expressed as a serial number or as text (e.g. "06-21-94" or "21-Jun-94").

Remarks The **MONTH** returns a number ranging from 1 (January) to 12 (December).

See Also **DAY**, **HOUR**, **MINUTE**, **NOW**, **SECOND**, **TODAY**, **WEEKDAY** and **YEAR** functions

Examples `MONTH("06-21-94")` returns 6

`MONTH(34626)` returns 10

4.2.2.64 N

Description Tests the supplied value and returns the value if it is a number.

Syntax **N**(*value*)

The *value* is a value or a reference to a cell containing a value to test.

Remarks Numbers are returned as numbers, serial numbers formatted as dates are returned as serial numbers and the logical function TRUE() is returned as 1. All other expressions return 0.

See Also **T** and **VALUE** functions

Examples `N(32467)` returns 32467

`N(A4)` returns 1 if A4 contains the logical function True.

4.2.2.65 NA

Description Returns the error value #N/A, which represents "not available".

Syntax **NA**()

Remarks Use the **NA** to mark cells that lack data without leaving them empty. Empty cells may not be correctly represented in certain calculations.

Although the **NA** does not use any arguments, you must supply the empty parentheses to correctly reference the function.

See Also **ISNA** function

4.2.2.66 NOT

Description Returns a logical value that is the opposite of its value.

Syntax **NOT**(*logical*)

The *logical* is an expression that returns a logical value (e.g. True or False).

Remarks If the logical is false, the **NOT** returns True. Conversely, if the logical is true, the **NOT** returns False.

See Also **AND**, **IF** and **OR** functions

Examples `NOT(TRUE())` returns False

`NOT(MONTH("12/25/94") = 12)` returns False

4.2.2.67 NOW

Description Returns the current date and time as a serial number.

Syntax **NOW**()

Remarks In a serial number, the numbers to the left of the decimal point represent the date. The numbers to the right of the decimal point represent the time. The result of this function changes only when a recalculation of the worksheet occurs.

See Also **DATE**, **DAY**, **HOUR**, **MINUTE**, **MONTH**, **SECOND**, **TODAY**, **WEEKDAY** and **YEAR** functions

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4.2.2.68 ODD

Description Rounds the specified number up to the nearest odd integer.

Syntax **ODD**(*number*)

The *number* is any number, a formula that evaluates to a number or a reference to a cell that contains a number.

See Also **CEILING**, **EVEN**, **FLOOR**, **INT**, **ROUND** and **TRUNC** functions

Examples `ODD(3.5)` returns 5

`ODD(6)` returns 7

4.2.2.69 OFFSET

Description Returns the contents of a range that is offset from a starting point on the spreadsheet.

Syntax **OFFSET**(*reference*, *rows*, *columns* [, *height*] [, *width*])

The *reference* is a reference to a cell on which the offset reference is based. If you specify a range reference, the #VALUE! is returned.

The *rows* is the number of rows of the reference that represents the upper left cell of the offset range. A positive number represents rows below the starting cell. A negative number represents rows above the starting cell. If the *rows* places the upper left cell of the offset range outside the spreadsheet boundary, the #REF! is returned.

The *columns* is the number of columns of the reference that represents the upper left cell of the offset range. A positive number represents the columns to the right of the starting cell. A

negative number represents the columns to the left of the starting cell. If the *columns* places the upper left cell of the offset range outside the spreadsheet boundary, the #REF! is returned.

The *height* is a positive number representing the number of rows to include in the offset range. Omitting this argument assumes a single row .

The *width* is a positive number representing the number of columns to include in the offset range. Omitting this argument assumes a single column.

Remarks The **OFFSET** does not change the current selection on the worksheet. Because it returns a reference, the **OFFSET** can be used in any function that requires or uses a cell or range reference as an argument.

See Also **COLUMN**, **INDIRECT** and **ROW** functions

Examples `OFFSET(B1, 3, 2, 1, 1)` returns the contents of cell D4.

`SUM(OFFSET(A1, 2, 4, 3, 2))` equals the sum of the range E3:F5.

4.2.2.70 OR

Description Returns True if at least one of a series of logical arguments is true.

Syntax **OR**(*logical_list*)

The *logical_list* is a list of conditions separated by commas. You can include as many as 30 conditions in the list. The list can contain logical values or a reference to a range containing logical values. Text and empty cells are ignored. If there are no logical values on the list, the error value #VALUE! is returned.

See Also **AND**, **IF** and **NOT** functions

Examples `OR(1 + 1 = 1, 5 + 5 = 10)` returns True because one of the arguments is true.

4.2.2.71 PI

Description Returns the value of pi (π), which is approximately 3.14159265358979, when calculated to 15 significant digits.

Syntax **PI**()

Remarks Although the **PI** does not use arguments, you must supply the empty parentheses to correctly reference the function.

See Also **COS**, **SIN** and **TAN** functions

4.2.2.72 PRODUCT

Description Multiplies a list of numbers and returns the result.

Syntax **PRODUCT**(*number_list*)

The *number_list* is a list of as many as 30 numbers separated by commas.

The list can contain numbers, logical values, text representations of numbers or a reference to a range containing those values.

Error values or text that cannot be translated into numbers return errors.

If a range reference is included in the list, text, logical expressions and empty cells in the range are ignored.

All numerical values incl. 0 are used in the calculation.

See Also **FACT** and **SUM** functions

Examples `PRODUCT(1, 2, 3, 4)` returns 24

4.2.2.73 PROPER

Description Returns the specified string in a proper case format.

Syntax **PROPER**(*text*)

The *text* is any string.

Remarks In the proper case format, the first alphabetic character in a word is capitalized. If an alphabetic character follows a number, punctuation mark or a space, it is capitalized. All other alphabetic characters are lowercase. Numbers are not changed by the **PROPER**.

See Also **LOWER** and **UPPER** functions

Examples PROPER("3rd Control") returns "3Rd Control"

PROPER("PROLIFERATION INDEX") returns "Proliferation Index"

4.2.2.74 RAND

Description Returns a number selected randomly from a uniform distribution greater than or equal to 0 and less than 1.

Syntax **RAND**()

Remarks Although the **RAND** does not use arguments, you must supply the empty parentheses to correctly reference the function.

Examples `RAND()*10` returns a random number greater than or equal to 0 and less than 10.

4.2.2.75 REPLACE

Description Replaces part of a text string with another text string.

Syntax **REPLACE**(*orig_text*, *start_position*, *num_chars*, *repl_text*)

The *orig_text* is the original text string.

The *start_position* is the character position where the replacement begins.

If the *start_position* is greater than the number of characters in the *orig_text*, the *repl_text* is appended to the end of the *orig_text*.

If the *start_position* is less than 1, the #VALUE! is returned.

The *num_chars* is the number of characters one wishes to replace. If this argument is negative, the #VALUE! is returned.

The *repl_text* is the replacement text string.

See Also **MID**, **SEARCH** and **TRIM** functions

Examples `REPLACE("For the year: 1993", 18, 1, "4")` returns "For the year: 1994"

4.2.2.76 REPT

Description Repeats a text string a specified number of times.

Syntax **REPT**(*text*, *number*)

The *text* is any text string.

The *number* is the number of times that you want the text to be repeated. If the *number* is 0, empty text ("") is returned.

Remarks The result of the **REPT** cannot exceed 255 characters.

Examples `REPT("error-", 3)` returns "error-error-error-"

4.2.2.77 RIGHT

Description Returns the characters furthest right from the given text string.

Syntax **RIGHT**(*text* [, *num_chars*])

The *text* is any text string.

The *num_chars* is the number of characters one wishes to return. The value must be greater than or equal to zero. If the *num_chars* is greater than the number of characters in the text, the entire string is returned. Omitting this argument assumes a value of 1.

See Also **LEFT** and **MID** functions

Examples `RIGHT("2nd Quarter")` returns "r"

`RIGHT("2nd Quarter", 7)` returns "Quarter"

4.2.2.78 ROUND

Description Rounds the given number to the supplied number of decimal places.

Syntax **ROUND**(*number*, *precision*)

The *number* is any value.

The *precision* is the number of decimal places to which the *number* is rounded.

When a negative *precision* is used, the digits to the right of the decimal point are dropped and the absolute number of the significant digits specified by the *precision* are replaced with zeros.

If the *precision* is 0, the number is rounded to the nearest integer.

See Also **CEILING**, **FLOOR**, **INT**, **MOD** and **TRUNC** functions

Examples `ROUND(123.456, 2)` returns 123.46

`ROUND(9899.435, -2)` returns 9900

4.2.2.79 ROW

Description Returns the row number of the supplied reference.

Syntax **ROW**(*reference*)

The *reference* is a cell or a range reference. Omitting this argument returns the row number of the cell in which the **ROW** is entered.

See Also **COLUMN** and **ROWS** function

Examples `ROW(B3)` returns 3

4.2.2.80 ROWS

Description Returns the number of rows in a range reference.

Syntax **ROWS**(*range*)

The *range* is a reference to a range of cells.

See Also **COLUMNS** and **ROW** functions

Examples `ROWS(A1:D5)` returns 5

`ROWS(C30:F35)` returns 6

4.2.2.81 SEARCH

Description Locates the position of the first character of a specified text string within another text string.

Syntax **SEARCH**(*search_text*, *text* [, *start_position*])

The *search_text* is the text one wishes to find.

The search string can contain wild card characters. The available wild card characters are * (an asterisk), which matches any sequence of characters and ? (a question mark), which matches any single character.

To search for an asterisk or a question mark, include a tilde (~) before the character.

The *text* is the text to be searched.

The *start_position* is the character position where the search begins. If the number you specify is less than 0 or greater than the number of characters in the text, the #VALUE! is returned. Omitting this argument assumes a starting position of 1.

Remarks The text is searched from left to right, starting from the position specified. The search is not case-sensitive. If the text does not contain the search string, the #VALUE! is returned.

See Also **FIND**, **MID**, **REPLACE** and **SUBSTITUTE** functions

Examples `SEARCH("?5", "Bin b45")` returns 6

`SEARCH("b", "Bin b45", 4)` returns 5

4.2.2.82 SECOND

Description Returns the second that corresponds to the supplied date.

Syntax **SECOND**(*serial_number*)

The *serial_number* is the time expressed as a serial number. The decimal portion of the number represents the time as a fraction of the day.

See Also **DAY**, **HOUR**, **MINUTE**, **MONTH**, **NOW**, **WEEKDAY** and **YEAR** functions

Examples `SECOND(.259)` returns 58

`SECOND(34657.904)` returns 46

4.2.2.83 SIGN

Description Determines the sign of the specified number.

Syntax **SIGN**(*number*)

The *number* is any number.

Remarks The **SIGN** returns 1 if the specified number is positive, -1 if it is negative and 0 if it is 0.

See Also **ABS** function

Examples `SIGN(-123)` returns -1

`SIGN(123)` returns 1

4.2.2.84 SIN

Description Returns the sine of the supplied angle.

Syntax **SIN**(*number*)

The *number* is the angle expressed in radians. If the angle is expressed in degrees, convert the angle to radians by multiplying the angle by PI()/180.

See Also **ASIN** and **PI** functions

Examples `SIN(45)` returns .85

`SIN(90)` returns .89

4.2.2.85 SINH

Description Returns the hyperbolic sine of the specified number.

Syntax **SINH**(*number*)

The *number* is any number.

See Also **ASINH** and **PI** functions

Examples `SINH(1)` returns 1.18

`SINH(3)` returns 10.02

4.2.2.86 SQRT

Description Returns the square root of the specified number.

Syntax **SQRT**(*number*)

The *number* is any positive number. If you specify a negative number, the #NUM! is returned.

See Also **SUMSQ** function

Examples `SQRT(9)` returns 3

`SQRT(2.5)` returns 1.58

4.2.2.87 STDEV

Description Returns the standard deviation of a population based on a sample of supplied values. The standard deviation of a population represents an average of deviations from the population mean within a list of values.

Syntax **STDEV**(*number_list*)

The *number_list* is a list of as many as 30 numbers separated by commas. The list can contain numbers or a reference to a range that contains numbers.

See Also **STDEVP**, **VAR** and **VARP** functions

Examples `STDEV(4.0, 3.0, 3.0, 3.5, 2.5, 4.0, 3.5)` returns .56

4.2.2.88 STDEVP

Description Returns the standard deviation of a population based on an entire population of values. The standard deviation of a population represents an average of deviations from the population mean within a list of values.

Syntax **STDEVP**(*number_list*)

The *number_list* is a list of as many as 30 numbers separated by commas. The list can contain numbers or a reference to a range that contains numbers.

See Also **STDEV**, **VAR** and **VARP** functions

Examples `STDEVP(4.0, 3.0, 3.0, 3.5, 2.5, 4.0, 3.5)` returns .52

4.2.2.89 SUBSTITUTE

Description Replaces a specified part of a text string with another text string.

Syntax **SUBSTITUTE**(*text*, *old_text*, *new_text* [, *instance*])

The *text* is a text string that contains the text one wishes to replace. You can also specify a reference to a cell that contains text.

The *old_text* is the text string to be replaced.

The *new_text* is the replacement text.

The *instance* specifies the occurrence of the *old_text* one wishes to replace. If this argument is omitted, every instance of the *old_text* is replaced.

See Also **REPLACE** and **TRIM** functions

Examples `SUBSTITUTE("User Name: Customer", "Customer", "John Doe")` returns "User Name: John Doe"

`SUBSTITUTE("Blank 1, Control 1", "1", "2", 2)` returns "Blank 1, Control 2"

4.2.2.90 SUM

Description Returns the sum of the supplied numbers.

Syntax **SUM**(*number_list*)

The *number_list* is a list of as many as 30 numbers separated by commas.

The list can contain numbers, logical values, text representations of numbers or a reference to a range containing those values.

Error values or text that cannot be translated into numbers return errors.

If a range reference is included in the list, text, logical expressions and empty cells in the range are ignored.

See Also **AVERAGE**, **COUNT**, **COUNTA** and **SUMSQ** functions

Examples `SUM(1000, 2000, 3000)` returns 6000

`SUM(A10:D10)` returns 4000 when each cell in the range contains 1000.

4.2.2.91 SUMSQ

Description Squares each of the supplied numbers and returns the sum of the squares.

Syntax **SUMSQ**(*number_list*)

The *number_list* is a list of as many as 30 numbers separated by commas.

The list can contain numbers, logical values, text representations of numbers or a reference to a range containing those values.

Error values or text that cannot be translated into numbers return errors.

If a range reference is included in the list, text, logical expressions and empty cells in the range are ignored.

See Also **SUM** function

Examples `SUMSQ(9, 10, 11)` returns 302

4.2.2.92 T

Description Tests the supplied value and returns the value if it is text.

Syntax **T**(*value*)

The *value* is the value one wishes to test.

Remarks Empty text ("") is returned for any value that is not text.

See Also **N** and **VALUE** functions

Examples `T("Report")` returns "Report"

`T(A4)` returns empty text ("") if A4 contains a number.

4.2.2.93 TAN

Description Returns the tangent of the specified angle.

Syntax **TAN**(*number*)

The *number* is the angle expressed in radians. To convert a number expressed as degrees to radians, multiply the degrees by 180/PI().

See Also **ATAN**, **ATAN2**, **PI** and **TANH** functions

Examples `TAN(45)` returns 1.62

`TAN(90)` returns -2.00

4.2.2.94 TANH

Description Returns the hyperbolic tangent of a number.

Syntax **TANH**(*number*)

The *number* is any number.

See Also **ATANH**, **COSH**, **SINH** and **TAN** functions

Examples `TANH(-2)` returns -.96

`TANH(1.2)` returns .83

4.2.2.95 TEXT

Description Returns the given number as text using the specified formatting.

Syntax **TEXT**(*number*, *format*)

The *number* is any value, a formula that evaluates to a number or a reference to a cell that contains a value.

The *format* is a string representing a number format. The string can be any valid format string including "General", "M/DD/YY" or "H:MM AM/PM". The format must be surrounded by a set of double quotation marks. Asterisks cannot be included in the format.

See Also **FIXED**, **T** and **VALUE** functions

Examples `TEXT(123.62, "0.000")` returns 123.620

`TEXT(34626.2, "MM/DD/YY")` returns 10/19/94

4.2.2.96 TIME

Description Returns a serial number for the supplied time.

Syntax **TIME**(*hour*, *minute*, *second*)

The *hour* is a number from 0 to 23.

The *minute* is a number from 0 to 59.

The *second* is a number from 0 to 59.

See Also **HOUR**, **MINUTE**, **NOW**, **SECOND** and **TIMEVALUE** functions

Examples `TIME(12, 26, 24)` returns .52

`TIME(1, 43, 34)` returns .07

4.2.2.97 TIMEVALUE

Description Returns a serial number for the supplied text representation of time.

Syntax **TIMEVALUE**(*text*)

The *text* is a time in text format.

See Also **HOUR**, **MINUTE**, **NOW**, **SECOND** and **TIME** functions

Examples `TIMEVALUE("1:43:43 am")` returns .07

`TIMEVALUE("14:10:07")` returns .59

4.2.2.98 TODAY

Description Returns the current date as a serial number.

Syntax **TODAY**()

Remarks This function is updated only when the worksheet is recalculated.

See Also **DATE**, **DAY** and **NOW** functions

4.2.2.99 TRIM

Description Removes all the spaces from the text except single spaces between words.

Syntax **TRIM**(*text*)

The *text* is any text string or a reference to a cell that contains a text string.

Remarks Text that is imported from another environment may require this function.

See Also **CLEAN**, **MID**, **REPLACE** and **SUBSTITUTE** functions

Examples `TRIM(" Sample 1, Sample 2 ")` returns "Sample 1, Sample 2"

4.2.2.100 TRUE

Description Returns the logical value True. This function always requires the trailing parentheses.

Syntax **TRUE**()

See Also **FALSE** function

4.2.2.101 TRUNC

Description Truncates the given number to an integer.

Syntax **TRUNC**(*number* [, *precision*])

The *number* is any value.

The *precision* is the number of decimal places allowed in the truncated number. Omitting this argument assumes a *precision* of 0.

Remarks The **TRUNC** removes the fractional part of a number to the specified precision without rounding the number.

See Also **CEILING**, **FLOOR**, **INT**, **MOD** and **ROUND** functions

Examples `TRUNC(123.456, 2)` returns 123.45

`TRUNC(9899.435, -2)` returns 9800

4.2.2.102 TYPE

Description Returns the argument type of the given expression.

Syntax **TYPE**(*expression*)

The *expression* is any expression.

Remarks The following table lists the *expression* types and numbers.

Expression type	Number
Number	1
Text string	2
Logical value	4
Error value	16

See Also **ISBLANK**, **ISERR**, **ISERROR**, **ISLOGICAL**, **ISNA**, **ISNONTEXT**, **ISNUMBER**, **ISREF** and **ISTEXT** functions

Examples `TYPE(A1)` returns 1 if cell A1 contains a number.

`TYPE("Customer")` returns 2

4.2.2.103 UPPER

Description Changes the characters in the specified string to uppercase characters.

Syntax **UPPER**(*text*)

The *text* is any string.

Remarks The numerical characters in the string are not changed.

See Also **LOWER** and **PROPER** functions

Examples `UPPER("Moving type:7")` returns "MOVING TYPE:7"

`UPPER("My Name")` returns "MY NAME"

4.2.2.104 VALUE

Description Returns the specified text as a number.

Syntax **VALUE**(*text*)

The *text* is any text string, a formula that changes to a text string or a cell reference that contains a text string. You can also specify a date or time in a recognizable format (e.g. M/DD/YY for dates or H:MM AM/PM for time). If the format is not recognized, the #VALUE! is returned.

See Also **FIXED** and **TEXT** functions

Examples `VALUE(9800)` returns 9800

`VALUE("123")` returns 123

4.2.2.105 VAR

Description Returns the variance of a population based on a sample of values.

Syntax **VAR**(*number_list*)

The *number_list* is a list of as many as 30 numbers separated by commas. The list can contain numbers or a reference to a range that contains numbers.

See Also **STDEV**, **STDEVP** and **VARP** functions

Examples `VAR(4.0, 3.0, 3.0, 3.5, 2.5, 4.0, 3.5)` returns .31

4.2.2.106 VARP

Description Returns the variance of a population based on an entire population of values.

Syntax **VARP**(*number_list*)

The *number_list* is a list of as many as 30 numbers separated by commas. The list can contain numbers or a reference to a range that contains numbers.

See Also **STDEV**, **STDEVP** and **VAR** functions

Examples `VARP(4.0, 3.0, 3.0, 3.5, 2.5, 4.0, 3.5)` returns .27

4.2.2.107 VLOOKUP

Description Searches the first column of a table for a value and returns the contents of a cell in the table that corresponds to the location of the search value.

Syntax **VLOOKUP**(*search_item*, *search_range*, *column_index*)

The *search_item* is a value, text string or reference to a cell containing a value that is matched against data in the top row of the *search_range*.

The *search_range* is the reference of the range (table) to be searched. The cells in the first column of the *search_range* can contain numbers, text or logical values. The contents of the first column must be in ascending order (e.g. -2, -1, 0, 2...A through Z, False, True). Text searches are not case-sensitive.

The *column_index* is the column in the search range from which the matching value is returned.

The *column_index* can be a number from 1 to the number of rows in the search range.

If the *column_index* is less than 1, the #VALUE! is returned.

When the *column_index* is greater than the number of rows in the table, the #REF! is returned.

Remarks **VLOOKUP** compares the information in the first column of the *search_range* to the supplied *search_item*. When a match is found, information located in the same row and supplied column (*column_index*) is returned.

If the *search_item* cannot be found in the first

column of the *search_range*, the largest value that is less than the *search_item* is used. When the *search_item* is less than the smallest value in the first column of the *search_range*, the #REF! is returned.

See Also **HLOOKUP**, **INDEX**, **LOOKUP** and **MATCH** functions

---

4.2.2.108 WEEKDAY

Description Returns the day of the week that corresponds to the supplied date.

Syntax **WEEKDAY**(*serial_number*)

The *serial_number* is the date expressed as a serial number or as text (e.g. "06-21-94" or "21-Jun-94").

Remarks **WEEKDAY** returns a number ranging from 1 (Sunday) to 7 (Saturday).

See Also **DAY**, **NOW**, **TEXT** and **TODAY** functions

Examples `WEEKDAY(34399.92)` returns 1, indicating Sunday

`WEEKDAY("06/21/94")` returns 3, indicating Tuesday

4.2.2.109 YEAR

Description Returns the year that corresponds to the supplied date.

Syntax **YEAR**(*serial_number*)

The *serial_number* is the date expressed as a serial number or as text (e.g. "06-21-94" or "21-Jun-94").

See Also **DAY**, **HOUR**, **MINUTE**, **MONTH**, **NOW**, **SECOND**, **TODAY** and **WEEKDAY** functions

Examples `YEAR(34328)` returns 1993

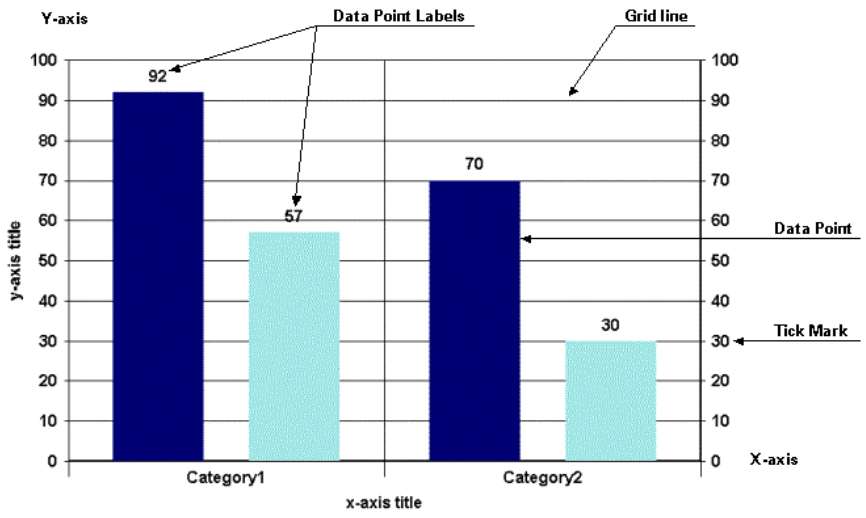
`YEAR("06/21/94")` returns 1994

4.3 Chart reference

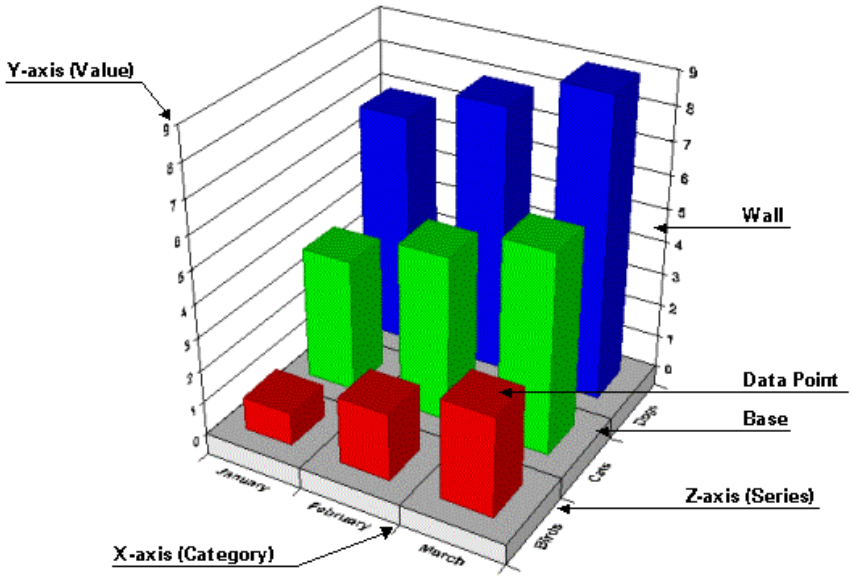
4.3.1 Chart terminology

Charts provide a graphical presentation of data. Values or data points are displayed in formats such as: bars, lines, markers, filled areas, bubbles, or pie slices. These data points are grouped into series that are identified with unique colors or patterns. In many chart types, one data point from each series is grouped together by category along an axis. Charts can also have titles, backdrops, legends, plots and footnotes.

The following illustration identifies the elements on a typical two dimensional (2-D) chart.



The following illustration identifies the elements on a typical three dimensional (3-D) chart.



4.3.2 Chart data grid

Each chart is associated with a data grid. This data grid is a table that holds the data that is being charted. The data grid can also include labels used to identify series and categories on the chart. The user, who designs a chart application, fills the data grid with information by inserting data or by importing data from a spreadsheet or array.

In most cases, each column in the data grid translates into one series on the chart. However, the Program supports a number of chart types that require two or more columns of data to chart a series. These chart types include XY, polar, bubble, hi-lo and gantt charts.

4.3.3 Chart types

4.3.3.1 Area charts

Use area charts to emphasize the relative importance of values over a period of time. An area chart focuses on the magnitude of change rather than the rate of change. Each filled area on the chart represents a series and is identified by a different color or pattern. Values are plotted on the vertical (Y) axis and categories are plotted on the horizontal (X) axis. You can also chart one or more series against the secondary Y axis instead of against the primary axis.

4.3.3.2 Bar charts

Use bar charts to compare one item to another or to compare a number of items over a period of time. These charts are particularly effective at showing large changes from one category to another. Each 2-D or 3-D bar represents a value in the data grid. Bars representing a series are located at the same position in each category and have the same color and pattern.

In 2-D charts values are grouped on the vertical (Y) axis and bars are grouped by category along the horizontal (X) axis. On 3-D charts the values are plotted on the vertical (Y) axis, the categories are grouped along the horizontal (X) axis and the depth (Z) axis shows the series.

4.3.3.3 Horizontal bar charts

Horizontal bars are similar to standard bar charts except that the categories are organized on a vertical (X) axis and the values are plotted on a horizontal (Y) axis.

4.3.3.4 Clustered bar charts

Series and data points on a clustered bar chart are displayed as they are on a 2-D bar chart, however, the chart and all the chart elements are displayed on a 3-D chart.

4.3.3.5 Line charts

Use line charts to show trends or changes in data over a period of time. These charts emphasize the time flow and rate of change, rather than the amount of change.

On 2-D line charts the values are plotted along the vertical (Y) axis and the categories are displayed on the horizontal (X) axis. On 3-D charts the values are plotted on the vertical (Y) axis, the categories are grouped along the horizontal (X) axis and the depth (Z) axis shows the series.

4.3.3.6 Step charts

Use step charts to compare items that do not show trends. Step charts display distinct points along the value (Y) axis with vertical lines showing the difference between each point. The horizontal (X) axis shows the categories.

4.3.3.7 Combination charts

Use combination charts to visually highlight the differences between multiple series of data. A different method can be used to draw each data series.

4.3.3.8 Pie and doughnut charts

Use pie or doughnut charts to show the relationship of parts to the whole. Each pie or doughnut represents a category. Each slice of the pie or doughnut represents a value in that category. You can separate or "explode" slices on a chart by clicking a slice and dragging it away from the rest of the pie or doughnut.

4.3.3.9 Radar charts

Use radar charts to show changes or frequencies of each series relative to a center point and to one another. Lines connect all the data markers in the same series. You can choose to fill the lines, thereby creating a radar area chart.

4.3.3.10 XY charts

Use XY charts to plot two groups of numbers as one series of XY coordinates. Each series on the chart requires two columns of data in the data grid. The first column holds the X coordinate and the second column the Y coordinate. The column label in the first column in each series is used to identify the series in the legend. Additionally, any formatting applied to the first column is used to display the series on the chart. Any formatting applied to the second column is ignored. You can use markers or lines or both to draw the XY points.

4.3.3.11 Polar charts

Use polar charts to show cyclical trends. The polar chart requires two columns in the data grid for each chart series: the first column holds the distance from the center of the chart (the radius), and the second column contains the angle on the perimeter of the chart. The column label in the first column in each series identifies the series in the legend. Additionally, any formatting applied to the first column is used to display the series on the chart. Any formatting applied to the second column is ignored.

4.3.3.12 Bubble charts

Use bubble charts to show a visual comparison using three coordinates. Each bubble requires three columns of data in the data grid. The first column holds the X coordinate, the second the Y coordinate and the third the bubble size. All the coordinates on a bubble chart measure values. Therefore, the vertical (Y) axis and the horizontal (X) axis both show values. The column label in the first column in each series identifies the series in the legend. Additionally, any formatting applied to the first column is used to display the series on the chart. Any formatting applied to the second and third columns is ignored.

4.3.3.13 Hi-Lo charts

Hi-lo charts are most commonly used to show stock market information. However, these chart types can also be applied to scientific data such as indicating changes in readings over a period of time. The vertical (Y) axis shows the values and the horizontal (X) axis shows the categories or dates.

The Program supports a number of variations of the hi-lo charts. These include: hi-lo-close with the close marker crossing the data point or extending to the right of the data point, open-hi-lo-close, and open-hi-lo-close bar.

The data in the data grid must be organized appropriately for each variation of the hi-lo chart.

A hi-lo chart requires two columns for each data series: the first column is used for the high point and the second is used for the low point.

A hi-lo-close chart requires three columns for each data series: the first column is used for the high point, the second for the low point, and the third for the closing point.

An open-hi-lo-close or an open-hi-lo-close bar chart (sometimes called candlestick charts) requires four columns of data for each data series: the first column is used for the opening point, the second for the high point, the third for the low point, and the fourth for the closing point.

The column label in the first column in each series identifies the series in the legend. Additionally, any formatting applied to the first column is used to display the series on the chart. Any formatting applied to the remaining columns that make up the series is ignored.

4.3.3.14 Gantt charts

Use gantt charts to display a range of bars that indicate the relative time required for various activities within a project. The horizontal axis (Y) shows the dates and the vertical axis (X) shows the categories. This chart type requires two columns of data for each series. The first column holds the starting date and the second column holds the duration.

4.3.4 Selecting chart elements

You can click the left mouse button once on a chart element in order to select it. The following table provides information on how to select each chart element.

To select...	Click...	Effect
Chart	On the chart, but not on a specific chart element.	Selection handles appear around the chart.
Chart title	Anywhere in the title area.	Selection handles appear around the title. You can resize or reposition it.
Footnote	Anywhere in the footnote area.	Selection handles appear around the footnote. You can resize or reposition it.
Legend	In the legend, but not the legend keys.	Selection handles appear around the legend. You can resize or reposition it.
Series	On an element in an unselected series or on the legend key identifying the series.	Selection handles appear on all elements of the chart series. A handle also appears on the legend key.
Series label	Anywhere on the series label.	Selection handles appear around the label. You can reposition it.
Plot	In the plot, but not on a specific chart element.	Selection handles appear around the chart plot. You can resize or reposition it.

Continued

To select...	Click...	Effect
Axis	On the axis text, axis line or axis ticks.	Selection handles appear on the axis. You cannot manually resize the axis.
Axis title	Anywhere in the axis title area.	Selection handles appear around the axis title.
Chart grid	On any grid line.	Selection handles appear around the grid.
2-D wall and 3-D wall or base	Any part of the base or wall other than a grid line.	Selection handles appear around the wall on a 2-D chart, and the base and wall on a 3-D chart.
Data point	Click a data point in a selected series or a data point in the same series as another selected data point.	Selection handles appear on the single data point only.
Data point label	Anywhere on the data point label.	Selection handles appear around the data point label. You can reposition it.

4.3.5 Formatting chart elements

You can format any element of a chart by changing the settings in a dialog box. Dialog boxes can be displayed by making a selection from a menu or by double-clicking the appropriate chart element.

4.3.6 Floating menu

Click the right mouse button anywhere within a chart to display the floating menu. Once the menu appears, use the left mouse button to select a menu item. Clicking menu items followed by an arrow character displays a submenu.

The following table describes the purpose of each item in the floating menu.

Item	Dialog box displayed	Purpose
General	Format Chart	Formats the fill, frame and shadow displayed on the chart backdrop and provides a convenient place to toggle on and off the display of the title, legend, footnote or the 2nd Y axis.
Plot	Format Plot	Changes the chart type, stacks or unstacks chart series, turns lines and markers on or off, controls the location of the plot, formats the plot backdrop, reorders series, sets chart type specific options and controls the 3-D chart formatting and lighting.
Series/Series	Format Series	Controls the display of series, plots a series on a secondary axis, formats series appearance such as bar shape, line style, markers, and fill colors, sets series smoothing and formats statistics lines and guidelines.

Continued

Item	Dialog box displayed	Purpose
Series/Label	Format Series Label	Controls the series label location and line style, edits the label text, formats the label text and position and formats the label backdrop.
Series/Data Point	Format Data Point	Formats the fill and marker of an individual data point.
Series/Data Point Label	Format Data Point Label	Controls the type and location of the label on an individual data point, formats the font and layout of the label text and formats the label backdrop.
Axis/Axis	Format Axis	Formats the width and color of the axis, axis grid, and axis ticks and changes the axis scale.
Axis/Label	Format Axis Label	Formats the axis label backdrop and font, and controls the positioning and alignment of the axis labels.
Axis/Title	Format Axis Title	Formats the axis title backdrop and font, edits the axis title text, and controls the display of the axis title and its location.
Legend	Format Legend	Formats the legend backdrop, changes the font used to display the legend text and controls the legend location.
Title	Format Title	Formats the title backdrop and font, edits the title text and controls the display of the title and its location.

Continued

Item	Dialog box displayed	Purpose
Footnote	Format Footnote	Formats the footnote backdrop and font, edits the footnote text, controls the display of the footnote and its location.
Copy	None	Places a copy of the current chart on the clipboard in Windows Metafile (.wmf) format.
Paste	None	Takes a graphic in Windows Bitmap (.bmp) or Windows Metafile (.wmf) format from the clipboard and places it on the selected element's backdrop or fill.
Print	Print	Displays the Print dialog box.
Save As	Save As	Saves the current file as a chart file (.vtc), a bitmap (.bmp) or a metafile (.wmf).
Load	Load Chart	Loads an existing chart file into the current chart control. The chart that you load replaces the chart already in the control.

If you use the menu to display the Format Axis, Format Axis Title, Format Axis Label, Format Series, Format Series Label, Format Data Point or Format Data Point Label dialog boxes, you are prompted to identify the specific axis, series or data point that you want to modify.

4.3.7 Double-clicking chart elements

You can also display dialog boxes by double-clicking chart elements. The following table lists the dialog box displayed, when you double-click various chart elements.

To format	Double-click	Dialog box	Tab
Chart Backdrop	The chart, but not on a specific chart element.	Format Chart	Backdrop
Footnote	Any part of the footnote.	Format Footnote	Text
Title	Any part of the title.	Format Title	Text
Legend Backdrop	Anywhere in the legend area other than the text or keys.	Format Legend	Backdrop
Legend Text	The legend text.	Format Legend	Font
Plot	Anywhere in the plot area, but not on a specific chart element.	Format Plot	Type
Axis Label	An axis label.	Format Axis Label	Font
Axis Line or Ticks	The line or ticks on an axis.	Format Axis	Scale
Axis Title	The axis title text.	Format Axis Title	Text
Grid	Any grid line.	Format Axis	Grid

Continued

To format	Double-click	Dialog box	Tab
3-D Base or Wall	Anywhere on the base or wall other than a grid line.	Format Plot	Base & Walls
Series	A chart element in an unselected series or the legend key identifying the series.	Format Series	Line for line type series Fill for all others
Data Point	A selected data point or a point in the same series as a selected data point.	Format Data Point	Options or Fill if series defaults have been overridden.
Series Label	The series label.	Format Series Label	Options or Text if series defaults have been overridden.
Data Point Label	The data point label.	Format Data Point Label	Options or Text if series defaults have been overridden.

4.3.8 Using dialog boxes

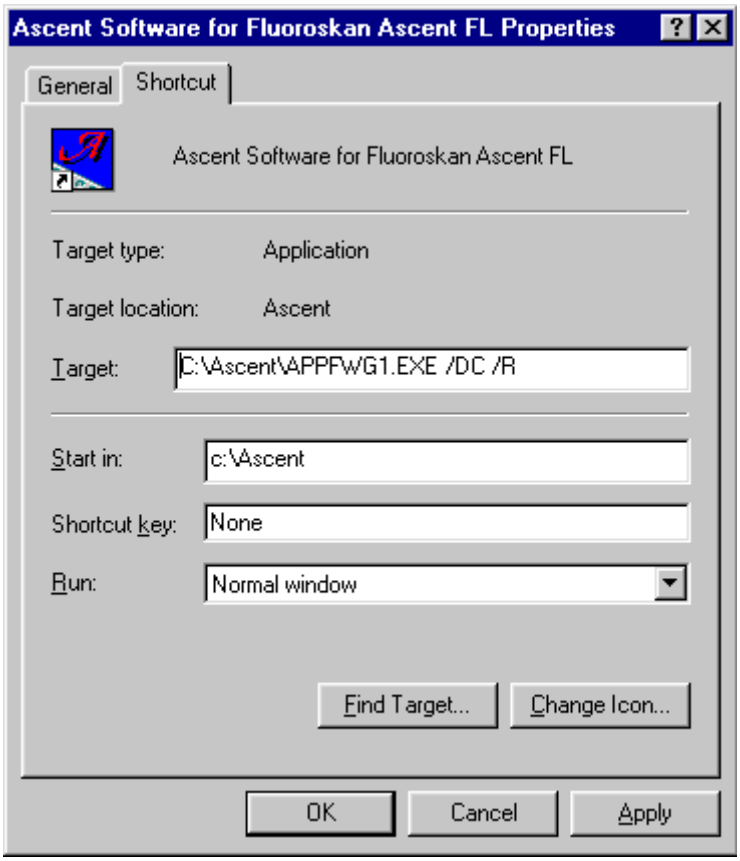
Most dialog boxes provide sets of options grouped on separate tabs. As you click each tab, the controls in the dialog box change to allow you to edit a different set of options. Any options that are not appropriate for the current chart type or situation are applied with gray shading.

4.4 Remote Control Interface

Ascent Software enables integration with robotics and HIS/LIMS systems by using the Remote Control Interface. The execution of predefined assays can be controlled remotely by changing files between Ascent Software™ and the host system.

Ascent Software is started with an additional /R command flag which indicates to Ascent Software that it needs to start monitoring a file named “REMOTE.CMD” in its own working directory.

Click on your Ascent Software icon with the right mouse button, select **Properties → Shortcut** and add the /R command flag as illustrated below, e.g. **C:\Ascento\APPFWG1.EXE /DC /R**.



When you start Ascent Software, you will see on top of the Ascent window a text similar to the following:

Ascent Software Version 2.5 - DEFAULT.SEC In Remote Control

which now indicates that the software is monitoring the REMOTE.CMD file to exist in its directory (in this example the C:\ASCENTO - directory).

Create a (simple) session and give it the name **"remote.sec"**.

Note: **Use the correct session filename extensions**. In the example below ***.sec** has been used for the Fluoroskan Ascent FL session files.

Use *.**sed** for the Multiskan Ascent session files, *.**see** for the iEMS Ascent session files, *.**sef** for the Fluoroskan Ascent session files, and *.**sel** for the Luminoskan Ascent session files, respectively.

Note: You should not run Ascent Software in REMOTE mode and manually at the same time, since this may cause some unexpected situations and a possible crash. To avoid this you should have at least two icons, one for normal use and one for remote use.

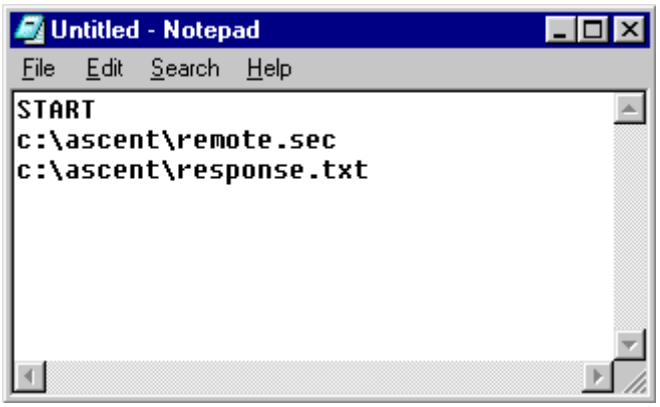
REMOTE.CMD file

The command set is described in the Ascent Software Remote Control Interface (Interface based on files) document.
This document describes the syntax of the commands which are:

- START
- ABORT
- INSTRUMENT STATE
- KILL
- CONTINUE

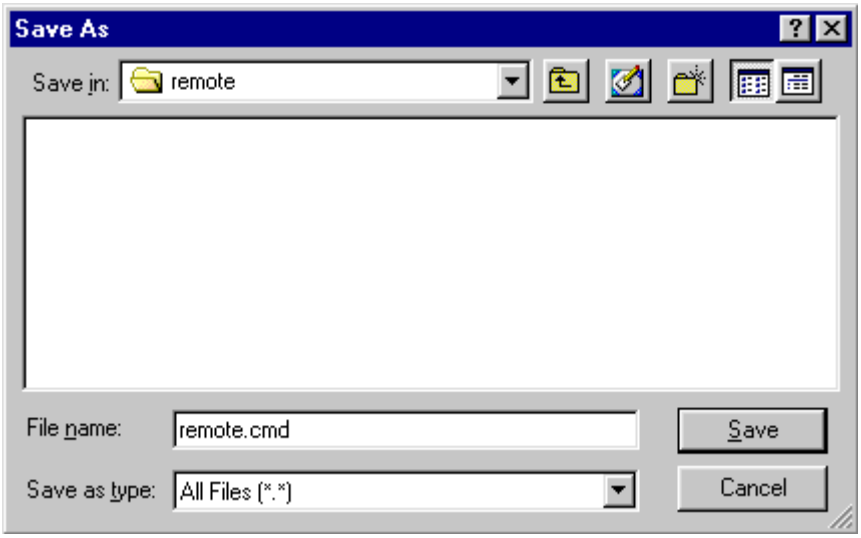
This file can be created using e.g. MS Notepad (**Start → Programs → Accessories → Notepad**).

START
c:\ascento\remote.sec
c:\ascento\response.txt



DO NOT forget to type the .extensions.

Save the file in another directory (c:\remote) with the name "REMOTE.CMD". Note that you have to select **"All Files (*.*)"** as the Save As type:



Using Explorer locate your (c:\remote\) **remote.cmd** file and copy (select the file and while pressing the Ctrl key drag and drop) this file into your Ascent (c:\ascento) directory.

Note for real robot systems: It is recommended to create/edit a file with another name than "remote.cmd" (e.g. "remote.cm_") in the Ascent directory. When the file is ready, it should be renamed **"remote.cmd"** by using the rename command (rename remote.cm_ remote.cmd). In this way the file is ready and free (not half-ready or used by another program) when Ascent Software detects it.

As soon as you have copied the file, Ascent Software recognizes the file, opens the file and starts to run the defined session (remote.sec).
Once the run is completed in this example, a response file named **"response.txt"** is generated in the defined directory (c:\ascento). The file can look like this:

```
[HEADER]
Instrument_Type=Fluoroskan Ascent FL 1.8
Instrument_Serial_Number=374000-007-0C
COM_port=0
Date_Time_Started=30.12.1997 13:6:20
Date_Time_Ended=30.12.1997 13:6:45
Input_Filename=c:\ascento\remote.sec
Output_Filename=c:\ascento\response.txt

[RESULT_FORMAT]
Plate_Type=96
Number_of_Plate_Data=1
Number_Columns=12
Number_Rows=8
Column_Dimension=1
Row_Dimension=1

[DATA01]
ROW1=  1.365290 1239231  2.390992 1239237  12.775000
ROW2=  1.247860 1239470  2.038040 1239464  10.887500
ROW3=  1.314892 1239577  3.107760 1239583  11.355630
ROW4=  1.214340 1239816  1.801290 1239810  10.971920
ROW5=  1.509920 1239924  4.712982 1239930  19.167600
ROW6=  1.556931 1240163  6.065250 1240157  23.241800
ROW7=  1.629191 1240270  6.431550 1240276  23.153000
ROW8=  1.763220 1240509  6.358040 1240503  22.923640
```

(The data extends up to 12 columns ->)

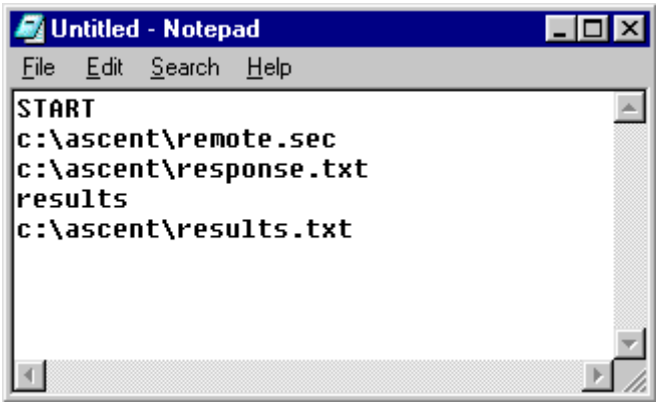
When the **remote.cmd** file has been detected and read by Ascent Software, the file is deleted from the directory. Now it is possible to write (copy) another file in this directory inquiring e.g. for the state of Ascent Software (STATE), continue after a **Pause** step (CONTINUE), launch a new plate with the same (or different) session (START) etc. Finally you can exit Ascent Software by sending a KILL command file.

Note: By default if the **response** file already exists, the file is overwritten.

The START command can have optional parameters, such as APPEND. That means that the output file is appended and not overwritten.
Another option is a PLATEID = followed with a plate identification code. If this option is used, the plate identification code is added to the response file.

You can also save individual sheets from the **Results Desktop**. This is handy when you have predefined report sheets. Then the command file can look like this:

START PLATEID=12345 APPEND
c:\ascento\remote.sec
c:\ascento\response.txt
results
c:\ascento\results.txt,



where the **Results** sheet is your report sheet.

Note: Be sure to write the sheet name exactly in the same way as in your session, since the sheet names are case-sensitive. Otherwise there will be an Application error.

The **results.txt** file can look like this in Excel:

Session: c:\ascento\remote.sec
Started at: 30.12.1997 14:19
Filter pair (nm): Ex=485 Em=538

	1	2	3	4	5	6
A	1.309	2.373	12.881	48.405	150.513	25.494
B	1.28	2.017	10.864	45.796	143.511	24.079
C	1.322	3.137	11.272	43.611	139.964	22.321
D	1.218	1.791	11.02	43.365	141.633	21.709
E	1.515	4.7	19.24	75.308	223.062	107.191
F	1.554	6.124	23.027	82.877	231.391	116.059
G	1.668	6.495	23.194	78.094	230.964	20.708
H	1.749	6.242	22.933	79.244	230.82	21.16
AVG	1.452	4.11	16.804	62.088	186.482	44.84
MIN	1.218	1.791	10.864	43.365	139.964	20.708
MAX	1.749	6.495	23.194	82.877	231.391	116.059
STD	0.184	1.883	5.452	16.964	42.742	38.65

(Data extends to 12 columns ->)

Note: Another way of saving sheets is to have a **Save**/**Load** step (**Sheet → Steps**) in your session and check the **Autoname file** function.

Note for real robot systems: Even when Ascent Software writes the results as a separate file, the system control software should monitor the **response.txt** file, not the other result file. That is because Ascent Software can still write the rest of the results in the file when this result file is seen by the system control software. When the response.txt file is made, Ascent Software has performed all the actions and the results file can be used. It is also recommended to verify that there are no error messages in the response.txt file before using the result files.

Pause step
If you need to drive the plate out during a session and access the plate through some other automated process, use the Pause step. During the Pause step the plate is driven out and it can be manipulated. When the system is ready to continue the session, write a REMOTE.CMD file with the CONTINUE command.

Example on how to demonstrate/test remote functions

Assuming that there are two sessions, namely session1.sec and session2.sec, it is possible to run Ascent Software continuously with the following batch file:

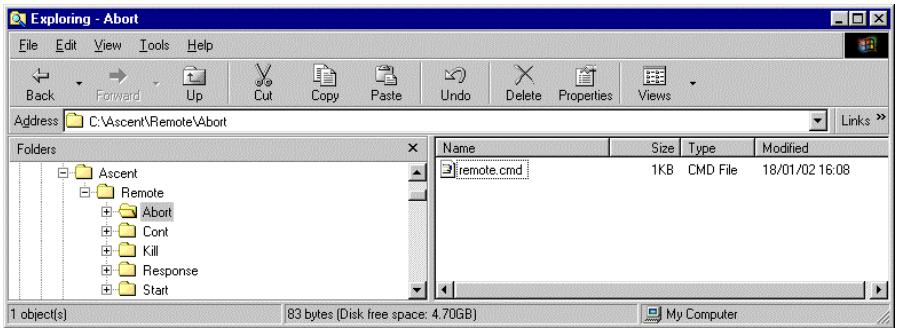
Contents of the remote.bat file

```
@echo off
if exist response.txt del response.txt
:start
echo
choice /C:yn /Ty,5 Continue ?
if errorlevel 2 goto end
copy session.1 remote.cm_
rename remote.cm_ remote.cmd
:wait1
choice /C:yn /Ty,5 Continue ?
if errorlevel 2 goto end
if not exist response.txt goto wait1
find /C "[ERROR]" response.txt
if not errorlevel 1 goto error
del response.txt
copy session.2 remote.cm_
rename remote.cm_ remote.cmd
:wait2
choice /C:yn /Ty,5 Continue ?
if errorlevel 2 goto end
if not exist response.txt goto wait2
find /C "[ERROR]" response.txt
if not errorlevel 1 goto error
del response.txt
goto start
:error
echo Error in response.txt file
:end
```

Contents of the session.1 file
START
session1.sec
response.txt

Contents of the session.2 file
START
session2.sec
response.txt

To demonstrate and test different remote commands, it is recommended to have remote.cmd files, which have different commands, in folders of their own. By copying files in the right order, it is possible to show the effect of different commands.



4.5 Computer control commands

4.5.1 Remote commands of the Ascent Instrument

The Ascent Instrument connected to a PC uses the serial port (1...4). The baud rate is 9600 with 1 start bit, 8 data bits, 1 stop bit and no parity.

XON/XOFF software handshaking is used.

4.5.2 Protocol

All data is transferred in case-sensitive ASCII lines. The end character of the command and response lines is <CR> and <LF> or all possible combinations thereof (CR, LF, CR LF, LF CR). The maximum length of the command or response line is 200 characters.

4.5.3 Command format

The command line contains 3 unique header characters, parameters and end character(s). The header characters are used to separate different commands. Parameters are separated using the <SPACE> character. The end characters of lines are <CR><LF>.

Example: 'TEM 370 0'<CR><LF>

4.5.4 Response format

Response lines consist of the header part of the command (3 character), response information line(s), the response end field and the status and end character of lines.

All commands are responded by sending a line, which contains the header part of the command (3 character) immediately when the execution of the command is started.

It is possible to send response information in more than one line. Every line starts with the header part of the original command and ends with <CR>< LF>. The fields of the response information string are separated using the <SPACE> character.

The last line of the response contains the header part of the original command, end field characters "END", status characters and the end characters <CR><LF>. Some of the commands have wait features, which define if the last response line is acquired after the command is executed or after the execution is started.

Example 1: Response to the TEM command with "no errors" status.

'TEM'<CR><LF>

'TEM END 0'<CR><LF>

4.5.5 Buffering

The PC and the instrument are able to receive more than one command line at a time. Receiver buffer overflows are handled using XON/XOFF handshaking. The maximum number of received characters is 2 Kbytes.

Note: The abort command is always executed immediately.

4.6 Warning and error messages

Usually the meaning of warning and error messages are self-explanatory and any required correction is obvious. However, if the meaning of the message is unclear, we recommend you to repeat the past action. If the same message is generated once more, study the service manual or contact your local dealer.

This chapter lists warning and error messages that the instrument or Ascent Software generates.

4.6.1 Serial communication

Message	Reason	Actions
• Could not open serial port COM"NUMBER".	The serial port is maybe used by another application.	1. Close other applications. 2. Reset the computer. 3. Contact PC support.
• Failed to open serial port COM"NUMBER".	The serial port is maybe used by another application.	1. Close other applications. 2. Reset the computer. 3. Contact PC support.
• No response from the instrument.	The instrument and Ascent Software are not connected.	1. Ensure that the cable is connected in both ends. 2. Reset the computer and the instrument.
• Serial port framing error.	The serial cable may be damaged.	Ensure that the cable is undamaged.
• Serial port parity error.	The serial cable may be damaged.	Ensure that the cable is undamaged.
• Serial port receiver buffer overflow.	The computer did not get all the data from the serial port.	See readme.txt file in the Ascent directory.
• Serial port receiver overrun error.	The computer did not get all the data from the serial port.	See readme.txt file in the Ascent directory.

4.6.2 Printer

Message	Reason	Actions
• Error encountered during printing.	An error did occur during printing.	Ensure that the printer and printer settings are correct.
• Printer error.	There is a problem in the printer.	Ensure that the printer power is on and is online.
• Printing error.	There may be a problem in the printer settings.	Ensure that the printer settings are correct.
• Printing aborted in the Print Manager.	Print jobs were canceled in the Print Manager.	Try again.

4.6.3 Sheet

Message	Reason	Actions
• Invalid formula syntax.	The command you have entered is incorrect.	Check the list separator in the Windows environment. Refer to A-Z Worksheet Function Reference in the Reference part of the manual. Refer to Section *Before Installation* in the Overview part of the manual.
• Zero concentration not allowed. Try 0.0001 instead.	The fit type is 4PL or the conc. transformation is log and the concentration zero.	Change the fit type, transformation or the concentration.
• The same concentration is not allowed in different calibrators.	Different calibrators have the same concentration.	Change the calibrator concentration.
• Curve fit variable missing.	The hidden sheet specific data is corrupted or missing.	Create a new curve fit sheet.

Continued

Message	Reason	Actions
• Delete sheet: Cannot delete.	The Measure sheet is locked and cannot be deleted.	
• Error in sheet generation.	Sheet creation did not succeed.	Change the sheet properties.
• No layout found from the source sheet chain.	The layout cannot be found in the source sheet.	Create a layout in the layout editor. Run the session.
• No source sheet available.	The sheet given in the properties does not exist.	Set the existing sheet to the source sheet.
• No source sheet name available.	The sheet properties do not contain the source sheet name at all.	Set the source sheet name in the sheet properties.
• No space for a new sheet.	1. Out of memory. 2. The sheet cannot be created.	Refer to Windows Help. Try changing the name of the sheet.
• Not a valid filename.	The name is not a valid name.	Change the name.
• Plate dimensions missing.	The hidden sheet specific data is corrupted or missing.	Create a new source sheet.
• Plate layout start coordinate missing.	The hidden sheet specific data is corrupted or missing.	Create a new source sheet.
• Sheet already exists.	A sheet with the given name exists.	Try different sheet names. Give the sheet an unique name.
• Sheet variable missing.	The hidden sheet specific data is corrupted or missing.	Modify the sheet properties.
• Source sheet sizes are not the same.	The plate size in source sheets one and two are different.	Create new source sheets.
• The selected well type not found.	The selected well type is not found from the plate layout.	Check the well type.
• The typed well name not found.	The typed well name is not found from the plate layout.	Double check the typing.

Continued

Message	Reason	Actions
• At least two enabled calibrators required.	There are less than 2 calibrators in the layout of the source sheet.	Add the number of calibrators in the layout.
• Calibrators measurement values are identical or missing.	The Curve Fit sheet is created before the measurements are done.	Executing the session will correct this automatically.
• There is something else than a number in the source table.	The Curve Fit sheet failed to perform the calculation.	Check that the source data is numbers.

4.6.4 File input/output

Message	Reason	Actions
• Cannot find the “FILENAME”.	The specified filename is not found.	Ensure that the filename and path are correct.
• Out of disk space.	The disk is full.	Some unused files should be deleted or the Recycle Bin should be emptied.
• Unable to read the file “FILENAME” from the disk.	The specified file is not found or the disk is damaged.	Ensure that the filename and path are correct. Try to read the floppy disk from another computer.
• Unable to write the file “FILENAME” on the disk.	The disk may be damaged.	Try to write on another (floppy) disk.

4.6.5 User input/output

Message	Reason	Actions
• Input not in the valid list.	The user input is not recognized by the program.	Try to rewrite the input correctly. Usually the cursor is flashing in an unsatisfactory field.
• Invalid characters in the input.	The user input is not recognized by the program.	Try to rewrite the input correctly. Usually the cursor is flashing in an unsatisfactory field.
• The password length must be 5 to 10 characters.	The password has less than 5 or more than 10 characters.	Try to use another password.
• Passwords not identical.	The passwords were not typed identically.	Try again.
• The value should be in the range “NUMBER”, “NUMBER”, ... “NUMBER”.	The user input is not recognized by the program.	Try to rewrite the input correctly. Usually the cursor is flashing in an unsatisfactory field.
• The value should be in the range “NUMBER” to “NUMBER”.	The user input is not recognized by the program.	Try to rewrite the input correctly. Usually the cursor is flashing in an unsatisfactory field.

4.6.6 Steplist

Message	Reason	Actions
• Wrong temperature in step: “STEPNAME”. The heater unit is not connected.	The reader does not have the heater installed.	Remove the Step or change the target temperature.
• Duplicate step name: “STEPNAME”.	There are two steps that have identical names.	Change the name of either step.
• Executable steps not found.	There is only a General step within the Steplist.	Add steps (for example, a Measure step) to the Steplist.

Continued

Message	Reason	Actions
• Invalid sheet name. Check that the lowercase and uppercase characters are correct.	The sheet name described in the Save/Load step was not found.	Ensure that the name of the sheet is typed correctly.
• The Load step failed. Check that the filename and path are correct.	The filename described in the Save/Load step was not found.	Ensure that the name of the file and path are correct.
• No area definition in step: “STEPNAME”.	The measurement area is not defined.	Define the measurement area in the area definition window.
• The Save step failed. Check that the sheet name is correct.	The sheet name described in the Save/Load step was not found.	Ensure that the name of the sheet is typed correctly.
• Step name: “STEPNAME” already used in Results.	An identical name was found.	Change the name of the Measure step.

4.6.7 Miscellaneous

Message	Reason	Actions
• The input does not conform to a picture.	The user input is not correct for this field.	Try to type the input value according to the default value by using the same type of characters.
• The instrument operation was aborted.	The user has pressed the Abort button.	
• Unlisted error: “NUMBER”.	An unusual error has occurred in the instrument.	Contact your local Labsystems representative.
• Unlisted warning: “NUMBER”.	An unusual problem has occurred in the instrument.	Contact your local Labsystems representative.

4.6.8 Reader type related

Message	Reason	Actions
• Wrong measurement method.	The Reader is not able to carry out this method, i.e. the Reader is not correctly configured.	Use only measurement methods that can be performed by the Reader.
• Cannot load a "SESSIONNAME" session.	There is a version conflict between Ascent Software™ and the stored Session.	Use only sessions that are made with the current Reader and the current software version.

4.6.9 Multiskan Ascent related

Message	Reason	Actions
• The instrument received an unknown command.	The command is not recognized or has an invalid parameter.	Check that the serial cable is properly connected. This error may be reported if the serial cable is connected while the instrument is on.
• Too high instrument background signal.	During measurement the signal level is checked when the light path is blocked. If the level is too high, this error is reported.	Check that the instrument cover is properly closed. Check that the measuring chamber lid is closed. Contact service if the error persists.
• Automatic stepper offset adjustment failed.	The instrument was unable to detect the edges of the air blank hole, and thus could not adjust the offsets.	This error may be reported after the OFF command which is not used during normal operation. Leave the use of the OFF command to a service person.
• Cannot shake with the given shake parameters.	One of the parameters in a shake command is not within the allowed limits.	This error should never appear if the instrument is used in the standalone mode or through the Ascent PC software.

Continued

Message	Reason	Actions
• The required measuring head position is out of range.	This may occur if all the points of the array to be measured are not within the allowed moving area of the measuring head.	This error should never appear if the instrument is used in the standalone mode or through the Ascent PC software.
• Plate X stepper out of position tolerance.	There was too high a position error when the stepper passed the home sensor.	Check that the plate is properly installed in the plate holder. Contact service if the error persists.
• Plate X stepper timeout.	The stepper home sensor was not detected within the allowed time.	Contact service if the error persists.
• Measuring head Y stepper out of position tolerance.	There was too high a position error when the stepper passed the home sensor.	Contact service if the error persists.
• Measuring head Y stepper timeout.	The stepper home sensor was not detected within the allowed time.	Contact service if the error persists.
• Filter wheel position error.	There was too high a position error when the stepper passed the home sensor.	Contact service if the error persists.
• Filter wheel timeout.	The stepper home sensor was not detected within the allowed time.	Check that the filter wheel is in place. Contact service if the error persists.
• Measuring head XP stepper out of position tolerance.	There was too high a position error when the stepper passed the home sensor.	Contact service if the error persists.
• Measuring head XP stepper timeout.	The stepper home sensor was not detected within the allowed time.	Contact service if the error persists.

Continued

Message	Reason	Actions
• Cannot measure in continuous mode.	The acceleration ramp starts or the deceleration ramp ends outside the Y position limits.	This error should never appear if the instrument is used in the standalone mode or through the Ascent PC software.
• RAM error.	The RAM memory failed the startup test.	Contact service if the error persists.
• XP/Y measurement count error.	The number of columns or rows to measure is not within the allowed limits.	This error should never appear if the instrument is used in the standalone mode or through the Ascent PC software.
• Too high ground signal noise level.	During startup the A/D converter is tested by connecting the input to signal ground. This should produce a near-zero signal with little noise. If the noise is too high, this error is reported.	Contact service if the error persists.
• Gain steps 1, 10 not within tolerance.	During startup the two gain steps of the A/D converter are fitted together by applying a correction factor for the x10 gain. If this factor is not within the limits, this error is reported.	Contact service if the error persists.
• EEPROM checksum error.	The checksum byte of the EEPROM is incorrect. Parameters are lost.	Contact service if the error persists.

Continued

Message	Reason	Actions
• Too high stepper offset.	When adjusting the stepper offsets, either manually or automatically, one or more of the resulting offsets would be outside the limits. That offset is not changed.	This error may be reported after the OFF command which is not used during normal operation. Leave the use of the OFF command to a service person.
• Temperature error.	Invalid set value in the TEM command or the option not installed.	This error should never appear if the instrument is used in the standalone mode or through the Ascent PC software.
• Too high A/D converter ground offset.	During startup the A/D converter is tested by connecting the input to the signal ground. This should produce a near-zero signal with both gains x1 and x10. If the signal is not within the limits, this error is reported.	Contact service if the error persists.
• Lamp failure.	During autocalibration or measurement the signal measured through the air blank hole is too low. This may have several reasons, but the most likely one is that the lamp has failed.	Check/replace the lamp. Contact service if the error persists.
• Invalid serial number.	The serial number must be 1 to 20 characters long.	This error should never appear if the instrument is used in the standalone mode or through the Ascent PC software.

Continued

Message	Reason	Actions
• Missing filter/optics error.	During autocalibration a suitable lamp voltage for each filter is adjusted. If the resulting voltage is very low, it is very likely that the filter is missing. This error is reported if this missing filter is selected.	If the filter is not missing and the error persists, contact service.
• Lamp not ready.	After the lag time has expired, the lamp is not yet ready for measurement. This may occur if the lamp was off and a Measure command is executed before the lamp has been on for 5 seconds. The lag time must also be nonzero, but less or equal to 5 seconds for this warning to appear. The measurement will not start until the lamp has been on for 5 seconds.	Increase the lag time. This error should never appear in the standalone mode.
• Invalid filter(s) in step: "STEPNAME".	The selected / typed filter is not available.	Try another filter.
• The plate is too high for the Multiskan® Ascent. The maximum height is 15 mm.	The type of plate is too high for this instrument.	Change the type of plate.

Continued

Message	Reason	Actions
• Timer already expired.	If a command to wait for a timer to expire (WAI) is executed and the timer has already expired, this warning is returned. This error may also be reported if the lag time is too short for the measuring head to move to the first measuring position.	Use a longer lag or interval time.

4.6.10 Fluoroskan Ascent (including FL & CF), Luminoskan Ascent and Nepheloskan Ascent related

Message	Reason	Actions
• Did not find a suitable reference chip. Validate without a reference?	When validating a filter pair, none of the reference chips on the plate carrier gave an acceptable signal level.	If a slight decrease in the precision of the results is acceptable, you can validate the pair without a reference chip.
• The instrument received an unknown command.	The command was not recognized by the instrument.	If this error is reported repeatedly, contact service.
• The measurement interval is shorter than the integration time.	The time needed for doing a single measurement is longer than the requested interval time between measurements.	Increase the interval time or decrease the integration time so that the interval time is longer than the integration time.
• More than 65535 measurements per point requested.	The measurement parameters of the instrument would result in more than 65535 results per measurement point.	Contact service.

Continued

Message	Reason	Actions
• Cannot shake with the given shake parameters.	The combination of the shaking parameters results in too high a radial acceleration.	Decrease the shaking speed or the shaking diameter.
• Plate position undefined.	Attempt to shake the plate when the plate is out.	Only shake when the plate is in.
• Plate X/Y stepper out of position tolerance.	The actual and the expected plate positions differ too much at the home sensor of the stepper.	If the error persists, contact service.
• Plate X/Y stepper timeout.	The plate did not arrive at the home sensor within the expected time.	If the error persists, contact service.
• Emission filter out of position tolerance.	The actual and the expected filter wheel positions differ too much at the home sensor.	If the error persists, contact service.
• Emission filter timeout.	The filter wheel did not arrive at the home sensor within the expected time.	If the error persists, contact service.
• Excitation filter out of position tolerance.	The actual and the expected filter wheel positions differ too much at the home sensor.	If the error persists, contact service.
• Excitation filter timeout.	The filter wheel did not arrive at the home sensor within the expected time.	If the error persists, contact service.
• Filter pair not validated.	An attempt to measure with a filter pair that has not been validated.	Validate the filter pair before using it.

Continued

Message	Reason	Actions
• Too long ramp for a scan. Change the scanning direction or decrease the integration time.	The start of the acceleration ramp or the end of the deceleration ramp for scanning is outside the moving area of the plate.	Change the scanning direction or decrease the integration time or do not scan points near the edge of the plate.
• Autocalibration not carried out.	Cannot measure if autocalibration is not carried out.	Autocalibrate.
• Too long integration time for a scan measurement.	The instrument is not able to move the plate as slowly as the integration time requires.	Shorten the integration time.
• Instrument gain levels not within tolerance.	The instrument automatically selects between the gains 1, 10, 100 and 1000 when measuring. During startup these gains are checked and fitted together. If any of the gains differ too much from the nominal value, this error is reported.	Contact service.
• Too high factor drift.	Autocalibration measures a reference chip and calculates a correction factor for the measurement results. If it differs too much from the nominal value of 1.0, this error is reported.	First try validating the filter pair again. If this does not help or revalidation is required frequently, contact service.

Continued

Message	Reason	Actions
• Too high offset in temperature measurement.	The A/D converter offset of the temperature measuring electronics is too high to guarantee the specified temperature range.	Contact service.
• Too high stepper offset.	Attempt to set a too high stepper offset.	If the allowed stepper offset range is not large enough, there is a mechanical error. Contact service.
• Temperature set value out of range.	Attempt to set an incubation temperature that is out of range.	Use temperature set values within the allowed range.
• Instrument gain levels adjustment failed.	During startup the gains 1, 10, 100 and 1000 are fitted together. If this process fails, the error is reported.	Contact service.
• Dispenser init failed.	The dispenser failed to carry out the initialization.	If the error persists, contact service.
• Invalid dispenser command.	The dispenser received an unknown command.	If the error persists, contact service.
• Invalid dispenser command operand.	An invalid dispenser command parameter.	If the error persists, contact service.
• Invalid dispenser command sequence.	The order of the commands to the dispenser is invalid.	If the error persists, contact service.
• Dispenser EEPROM failure.	The dispenser firmware checksum does not match the calculated checksum.	If the error persists, contact service.
• Dispenser not initialized.	The dispenser cannot execute commands before it is initialized.	If the error persists, contact service.

Continued

Message	Reason	Actions
• Dispenser plunger overload.	The dispenser plunger did not reach the target position.	If the error persists, contact service.
• Dispenser valve overload.	The dispenser valve did not reach the target position.	If the error persists, contact service.
• Dispenser plunger move not allowed.	The dispenser valve is in bypass position.	If the error persists, contact service.
• Too many dispenser commands.	More commands were sent to the dispenser than it could buffer.	If the error persists, contact service.
• Dispenser timeout.	The dispenser is not responding.	If the error persists, contact service.
• Autocalibration validity expired.	Too much time has passed from the last autocalibration. The precision of the results may suffer.	The timing requirements of the session are too tight, there is no time to carry out the autocalibration. Modify the session so that there is time to autocalibrate.
• Unable to keep up with the requested timing.	The timing requirements of the session are too tight and cannot be fulfilled.	Relax the timing requirements.
• Too high signal, the measurement channel is saturated.	The measured signal gives a full scale reading.	Ensure that the filter pair is suitable for this measurement. Dilute the samples. In luminometric mode decrease the PMT voltage.
• Instrument measurement result range overflow.	The calculated result exceeds the numeric range of the instrument.	Decrease the user factor value.
• Too high instrument background signal.	During startup the background signal is checked. If it is too high, this error is reported.	If the error persists, contact service.

Continued

Message	Reason	Actions
• Instrument background signal noise level too high.	During startup the background signal is checked. If there is too much noise in it, this error is reported.	If the error persists, contact service.
• Lamp failure.	There is no signal through the reference channel. This is detected during autocalibration.	Change the lamp.
• Too high reference channel drift.	The reference channel gain is adjusted during validation and autocalibration. The validation gain is saved and if the resulting gain during autocalibration differs too much from the saved gain, this error is reported.	Revalidate the filter pair. If the error persists, contact service.
• Too high PMT drift.	The first autocalibration of a filter pair adjusts the PMT voltage to obtain the same reading from the reference chip as was measured during validation. If the resulting voltage differs too much from the one used in validation, this error is reported.	Revalidate the filter pair. If the error persists, contact service.

Continued

Message	Reason	Actions
• Nonvolatile parameters lost.	The calculated checksum of nonvolatile parameters does not match the saved checksum. Some or all of the nonvolatile parameters (validation data, stepper offsets, serial number, user factors) are lost. The lifetime of the backup battery for the memory is at an end.	Contact service.
• Invalid filter position.	The filter command requested a filter that was not on the filter wheel.	Contact service.
• If there is only one source sheet, it must be either dual or dual kinetic.	The Precalculation sheet needs two source sheets if the first source sheet is not dual or dual kinetic. The Precalculation sheet can only be created from two separate measurement steps or from a dual measurement containing two measurement parameters.	Set the second source sheet in the sheet properties.

Continued

Message	Reason	Actions
• Cannot dispense into a plate over 21 mm high.	The type of plate is too high for dispensing.	Change the plate type or remove all the Dispense steps from the Session.
• Dispensing is not allowed with plates less than 13.5 mm high.	The type of plate is too low for dispensing.	Change the plate type or remove all the Dispense steps from the Session.
• The integration time is too long in step “STEPNAME”. Longer than 10000 ms is allowed only in SINGLE measurements and when executed by one well.	The reader cannot have that long an integration time with the current parameters.	Change the integration time or some other parameters.
• The instrument does not support luminometric methods.	The reader is not able to carry out luminometric measurements.	Use only measurement methods that can be measured by the reader.
• Please confirm that the light guard is installed.	Luminometric measurements need a light guard to avoid high background noise.	Ensure that the light guard is installed.
• Please confirm that the light guard has been removed.	The type of plate is so high that the light guard cannot be used.	Ensure that the light guard is removed before any measurements are carried out.
• The instrument cover is open.	The cover of the instrument is open during measurement. Reported in luminometric measurements only.	If carrying out a luminometric measurement, ensure that the instrument cover is closed.

4.6.11 iEMS Reader MF related

Message	Reason	Actions
• Air blank failed.	Either the signal level on one or more channels was too high when measuring with the light path blocked or there was too high a signal level deviation between the channels when measuring air.	Check that the optics is not soiled and clean it, if necessary. Check that there is no leakage of light from outside the instrument into the measuring chamber. If the error persists, contact service.
• The plate holder is not inserted.	The plate holder is checked to be inserted in the carriage before driving the carriage into the reader. If the holder is not inserted, this error is reported.	Insert a plate holder in the carriage. Try another holder. Contact service.
• Measurement channel gains not within limits.	The measuring channel signal levels with one or more filters are not within limits after channel gains adjust. The measurement results may be incorrect if this error is reported.	Check that the optics is not soiled and clean it, if necessary. Check that there is no leakage of light from outside the instrument into the measuring chamber. Try with another filter wheel. If the error persists, contact service.
• Chopper timeout.	The chopper drum home position was not detected within the allowed time. Either the drum is not rotating or the position sensor is faulty.	Check that connector X6 on the reader PCB is properly inserted. Check that the chopper wheel rotates freely when the instrument power is off. If the error persists, contact service.

Continued

Message	Reason	Actions
• Chopper position error.	The detected chopper drum home position did not match the calculated chopper position. The chopper drum is not rotating properly.	Check that connector X6 on the reader PCB is properly inserted. Check that the chopper wheel rotates freely when the instrument power is off. If the error persists, contact service.
• Filter wheel not in position.	The filter wheel has been removed.	Insert the filter wheel.
• Filter wheel timeout.	The filter wheel home position was not detected within the allowed time. Either the wheel is not rotating or the position sensor is faulty.	Check that the filter wheel rotates freely when the instrument power is off. If the error persists, contact service.
• Filter wheel position error.	The detected filter wheel home position did not match the calculated filter position. The filter wheel is not rotating properly.	Check that the filter wheel rotates freely when the instrument power is off. If the error persists, contact service.
• Too high gain deviation between measurement channels.	The gain difference of adjusted gains between the measuring channels is too high. The reader may still seem to operate correctly but there is a risk of incorrect measurement results.	Check that the optics is not soiled and clean it, if necessary. Check that there is no leakage of light from outside the instrument into the measuring chamber. Try with another filter wheel. If the error persists, contact service.
• Invalid profile point number.	Well agglutination data of a profile point outside the range 1...26 was requested.	Contact service.

Continued

Message	Reason	Actions
• Invalid filter number.	The reader was requested to select a filter number not in the range of 1...8.	Contact service.
• Lamp failure.	The measured lamp intensity after switching the lamp on is too low.	Check and replace the lamp, if necessary. If the error persists, contact service.
• The lamp is off.	A measure or blank command is received, but the lamp is off.	Contact service.
• Shaker timeout.	The shaker home position was not detected within the allowed time. Either the shaker is not rotating or the position sensor is faulty.	Check that the shaker stepper motor rotates freely when the instrument power is off. If the error persists, contact service.
• Shaker position error.	The detected shaker home position did not match the calculated position. The shaker is not rotating properly.	Check that the shaker stepper motor rotates freely when the instrument power is off. If the error persists, contact service.
• Reference channel gain not within limits.	The reference channel signal level with one or more filters is not within limits after reference channel gains adjust. The measurement results may be incorrect if this error is reported.	Check the reference channel optics (the lenses to the far left) for spills or any other stains and clean it, if necessary. Check the filters. If the error persists, contact service.

Continued

Message	Reason	Actions
• Track timeout.	The track stepper home position was not detected within the allowed time. Either the track stepper is not rotating or the position sensor is faulty.	Check that the plate carriage moves freely when the instrument power is off. If the error persists, contact service.
• Track position error.	The detected track stepper home position did not match the calculated position. The track stepper is not rotating properly or the drive belt slips.	Check that the plate carriage moves freely when the instrument power is off. If the error persists, contact service.
• Invalid strip number.	A command was received which referenced a strip outside the range 1...12.	Contact service.
• Invalid shake mode.	Onset of shake in a mode not supported was requested.	Contact service.
• Invalid shake speed.	A shake speed outside the range 300...1500 rpm was requested.	Contact service.
• Invalid well number.	The well reference in a command was outside the range 1...96.	Contact service.
• Invalid temperature set value.	A temperature outside the range 14...40°C was requested.	Contact service.
• The reader cover is open.	The reader cover is not closed during measurement.	Close the green instrument cover. A faint click from a microswitch should be audible when the cover is closed. If the error persists, contact service.

Continued

Message	Reason	Actions
• Too much lag in track.	The position difference between detecting the home position of track when traveling in opposite directions is too high. There is probably a slack in the track drive belt. The positioning of the microplate is not accurate enough to guarantee correct measurement results.	Check that the plate carriage is securely clamped to the drive belt. Tighten the track belt by moving the drive wheel closest to the front of the instrument towards the front. But not too tight! If the error persists, contact service.
• Chopper drum not properly aligned.	The chopper drum is not adequately aligned with the optics assembly. The measurement results may be incorrect if this error is reported.	Contact service.
• Too high temperature measurement electronics offset.	The temperature measuring system is calibrated at startup. If the calibration correction is too big, this error is reported.	Contact service.
• Dispenser pump position error.	The detected dispenser pump home position did not match the calculated position. The pump is not rotating properly.	Check that the pump rotor rotates freely when the instrument power is off and the tubing is in rest position. If the error persists, contact service.

Continued

Message	Reason	Actions
• Dispenser pump timeout.	The dispenser pump home position was not detected within the allowed time. Either the pump is not rotating or the position sensor is faulty.	Check that the pump rotor rotates freely when the instrument power is off and the tubing is in rest position. If the error persists, contact service.
• Position error of dispenser tips.	The detected dispenser tips home position did not match the calculated position. The tips drive motor is not rotating properly.	Check that the tips stepper motor rotates freely when the instrument power is off. If the error persists, contact service.
• Timeout of dispenser tips.	The dispenser tips home position was not detected within the allowed time. Either the tips motor is not rotating or the position sensor is faulty.	Check that the tips stepper motor rotates freely when the instrument power is off. If the error persists, contact service.
• Invalid dispensing volume.	The dispenser cannot dispense the required volume.	Contact service.
• Invalid strip number for dispensing.	A command was received which referenced a strip outside the range 1...12.	Contact service.
• Invalid dispenser temperature value.	A temperature outside the range 14...40°C was requested.	Contact service.
• Internal timeout of reader while dispensing.	The reader did not respond to a command from the dispenser.	If the error persists, contact service.
• The reader reported an error while dispensing.	The reader reported an error in the dispenser during dispensing.	Contact service.

Continued

Message	Reason	Actions
• Unknown dispenser command.	The dispenser did not recognize the command it received.	Contact service.
• Too high temperature measurement electronics offset in dispenser.	The temperature measuring system is calibrated at startup. If the calibration correction is too big, this error is reported.	Contact service.
• Dispenser pump not primed.	The dispenser pump is not primed.	Contact service.
• Dispenser tubing not in operating position.	The dispenser pump tubing is not in operating position around the pump rotor.	Move the tubing cassette from rest position into operating position. A faint click from a microswitch should be audible when the cassette is inserted in the operating position slot. If the error persists, contact service.
• Wells must be present for dispensing.	The reader ensures before dispensing that the wells are present for all the columns to be dispensed into. This error is reported if the check fails.	Insert strips in all the dispense columns.
• Dispenser not responding.	The dispenser did not report that the dispensing was completed within the allowed time.	If the error persists, contact service.

4.7 File types used in Ascent Software

4.7.1 Work file types

Session files

*.sec	Fluoroskan Ascent FL session file
*.sed	Multiskan Ascent session file
*.see	iEMS Ascent session file
*.sef	Fluoroskan Ascent or Fluoroskan Ascent CF session file
*.sel	Luminoskan Ascent session file
*.ses	session file of earlier Ascent Software versions

Files produced by each session file

*.lay	file that contains all session layouts
*.pla	separate, editable layout file
*.vtb	file that contains all session sheets
*.vtg	file that contains all session graphs

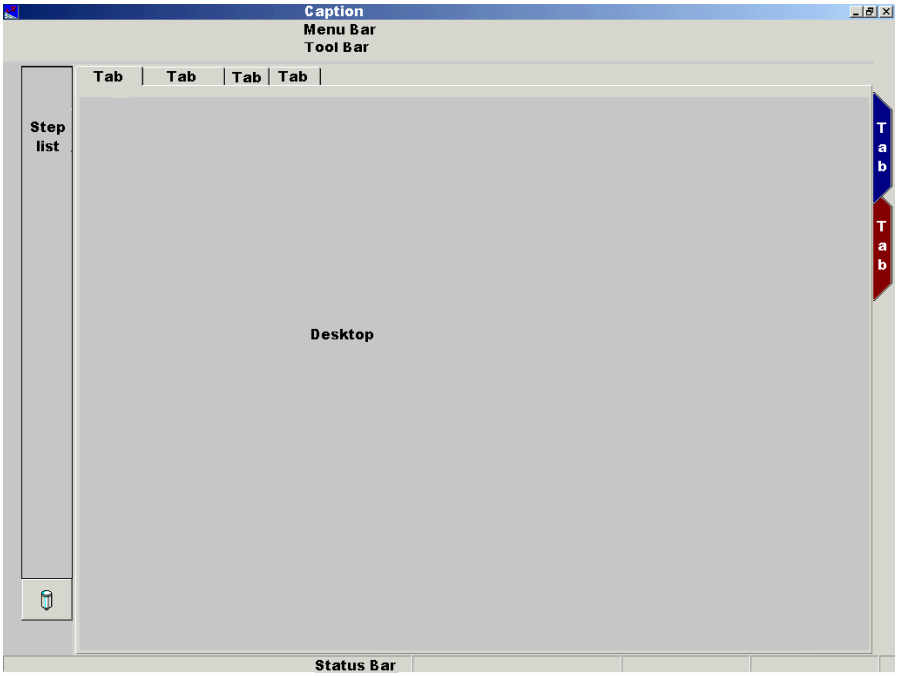
Miscellaneous files

*.txt	text file in ASCII format
*.vts	file of the Results sheets
*.xls	Microsoft Excel 4.0 file

4.8 Parts of the screen

4.8.1 General

Ascent Software is a Windows program operated with menus, notebook tabs and quick buttons. The Ascent program is started from the icon which is created at the installation.



The Windows-oriented drag-and-drop technique is used in the program. This means that some copying and controlling functions are done by picking up icon elements (with parameters) and dropping them in appropriate positions on the screen.

4.8.2 Menu Bar

The Menu Bar, which is located below the title bar along the top of the desktop window, contains textual selections to the functions of the user interface.

To view all the commands in a menu, do one of the following:

- Click the menu name, or
- Press ALT+n, where n is the underlined letter in the menu name. For example, press ALT+S to open the **Session** menu.

4.8.3 Tool Bar

The Tool Bar is displayed across the top of the desktop window below the menu bar. It contains quick buttons to the main functions of the active desktop.

To hide or display the Tool Bar, choose **Tool Bar** from the **View** menu (ALT, V, T).

The most used tool bar buttons are:

Click	Action
	Opens a new Session.
	Opens an existing Session. The program displays the Open dialog box in which you can locate and open the Session you want.
	Saves the active Session with its current name. If you have not named the Session, the program displays the Save As dialog box. The default exists.
	Selects the Measure step to the Steplist.

Continued

Click	Action
	Selects the Dispense step to the Steplist (does not apply to Multiskan).
	Selects the Dispense And Measure step to the Steplist (does not apply to Multiskan).
	Selects the Incubate step to the Steplist.
	Selects the Shake step to the Steplist.
	Selects the Pause step to the Steplist.
	Selects the Save/Load sheet step to the Steplist.
	Selects the Print step to the Steplist.
	Defines the tool to “Add wells to the measurement area”.
	Defines the tool to “Remove wells from the measurement area”.
	Defines the middle point of the well to be measured (does not apply to Multiskan, Nepheloskan or iEMS).
	Defines all the points in the well to be measured (does not apply to Multiskan, Nepheloskan or iEMS).
	Defines the horizontal diagonal of the well to be measured (does not apply to Multiskan, Nepheloskan or iEMS).

Continued

Click	Action
	Defines the vertical diagonal of the well to be measured (does not apply to Multiskan, Nepheloskan or iEMS).
	Prints the current worksheet.
	Prints the currently selected area.
	Creates a new worksheet.
	Deletes the current worksheet.
	Cuts the selected area to the Clipboard.
	Copies the selected area to the Clipboard.
	Pastes the contents of the Clipboard into the selected location.
	Zooms in the display at 10% intervals.
	Zooms out the display at 10% intervals.
	Creates a Blank Subtraction sheet.
	Creates a Curve Fit sheet
	Creates a Cutoff sheet.
	Enables/Disables the values in the cells.
	Opens the properties dialog of the sheet.

4.8.4 Desktops

The Desktop is the main window area of the program.

4.8.5 Status Bar

Displayed at the bottom of the Program window. The status bar shows the buttons and menu selection information, when the cursor moves over the selections. The status bar also contains fixed types of information, like the current time and the line state of the instrument.

To hide or display the status bar, choose **Status Bar** from the **View** menu (ALT, V, S).

Status information

Example	Description
Searching for...	The Reader is not connected to the Program.
Connected to...	The Reader is connected to the Program.

4.8.6 Tab

Desktop tabs are located to the right of the active desktop. The desktop tab selects the active desktop of the program. When the desktop is changed, the menu and status bars are also changed.

At the top or bottom of the **Procedure Desktop** you will find the Parameters, Area definition, Layout and the RunStatus tabviews. With these tabs you can change the page of the desktop. (**View → Tabs Bar On Top**)

At the bottom of the **Results Desktop** the spreadsheet tabviews are located. With these tabs you can change the current spreadsheet of the desktop.

4.8.7 Steplist

Located to the left of the **Procedure Desktop**. Shows the steps selected to the Steplist. The right mouse button also allows the selection of steps from the Steplist, when the mouse pointer is on the Steplist area.

4.9 Glossary and abbreviations

active	The window or icon that you are currently using or that is currently selected. Only one window or icon can be activated at a time. Keystrokes and commands and mouse operations affect the active window or icon. If a window is active, its title bar changes color to differentiate it from other windows. If an icon is active, its label changes color. Windows or icons on the desktop that are not selected are inactive.
A/D (or A to D)	ANALOG TO DIGITAL. Changing a signal from an analog form to a digitally coded form; *A/D converter* (or A-D converter, analog-to-digital converter); (analog to digital converter) device used to convert an analog input to a digital output form which can be understood by a computer.
address	**1.** The term most generally used to refer (in some way) to a location within the computer memory; the word *location* is actually used as a synonym. **2.** In communications, see addressing.
addressing	The method used to identify the location of a participant in a network. Addressing specifies where the participant is located rather than who they are or how to get there.
amb.temp.	ambient temperature

application	A role or task for which a computer system can be used or, more usually, the software used for such a purpose.
area filling	Painting a defined area with a specific color or pattern.
arrow keys (or direction keys, cursor keys)	Four keys on a computer keyboard with arrows engraved on the keycaps pointing up, down, left and right. They can be separate keys, usually found to the right of the typewriter keys or combined with other keys. The action performed by arrow keys is under program control, but usually involves moving the cursor or some part of the display in the indicated direction.
ASCII (or Ascii)	Acronym for American Standard Code for Information Interchange. A standard character encoding scheme introduced in 1963 and used widely on many machines.
attributes	Information about a file that indicates whether the file is read-only, hidden or system and whether it has been changed since it was backed up.
background application	An application that is running but is not active. The application cannot receive user input.
background noise	The noise inherent in a line or circuit, independent of the presence of a signal.
backup	A resource that is, or can be used as, a substitute when a primary resource fails or when a file has been corrupted. The word is also used as a verb, to back up, i.e. to make a copy in anticipation of future failure or corruption.

bandwidth	**1.** For bandpass filters, it is the full width of the pass band measured at one-half the peak transmittance, expressed in nanometers and microns. **2.** Range of frequencies. **3.** Measure of the amount of data that can be transmitted along a cable or channel or other medium. **4.** Measure of the range of frequencies that a monitor or CRT will accept and display.
baud rate	The number of times per second that a system, especially a data transmission channel, changes state. In the particular case of a binary channel, the baud rate is equal to the bit rate, i.e. 1 baud is 1 bit per second. For a general channel, 1 baud is 1 digit per second, 1 baud is 1 symbol per second or whatever the states of the system represent.
bit (binary digit)	**1.** Either of the two digits 0 and 1 in the binary number system. **2.** The fundamental unit of information used in information theory. It is the quantity of information required to distinguish between a pair of equiprobable events.
blank	**1.** Empty, i.e. not containing meaningful data. In a memory, blank cells may contain a particular bit pattern that has no assigned value. **2.** Blanks in the assays: *reagent blank*; reagent blank without any sample, *specific blank*; each calibrator, control, or sample has its own blank, and *both blanks*; both reagent blank and specific blank.
button	An area on a screen that when activated by means of a pointing device or predetermined key sequence causes an action to be initiated. When the button is activated or "pressed", its appearance will normally change so that it appears recessed. A horizontal or vertical row of buttons is called a *button bar*. See **command button**.

byte	A fixed number of bits that can be treated as a unit by the computer hardware. It is a subdivision of a word and typically comprises 8 bits, although 6, 7 or 9 bits are occasionally encountered. The letters B and b are used as symbols for byte, as in MB (megabyte) and GB (gigabyte), although the word is often written in full in such cases, as in Mbyte.
cascade	A way of arranging open windows on the desktop so that they overlap each other, with the title bar of each window remaining visible.
cascading menu	A hierarchical graphical menu system in which a side menu of subcategories is displayed when the pointer is placed on the main category.
case-sensitive	Requiring or making a distinction between upper and lower case letters.
cell	**1.** An address, a location in memory or a register, usually one capable of holding one bit. **2.** The basic unit of a spreadsheet or some other table of text, formed by the intersection of a row and column. It contains a label, value or formula with attributes such as size, font and color. **3.** The name given to a packet in one version of a packet switching system. Packet switching systems subdivide the data to be transmitted into a number of packets.
Centronics interface	A standard plug-compatible parallel interface for printers, first used in printers manufactured by Centronics Corp.
check box	A small square in a dialog box with an option alongside, allowing the option to be selected or cleared. Multiple check boxes allow as many options as needed to be selected.

checksum (or check total)	Program which checks that data (retrieved from memory) is correct, summing it and comparing the sum with a stored value.
chopper	**1.** Light interrupter used to produce a.c. output from a photocell. **2.** Mechanical or semiconductor switch used to modulate a d.c. signal so that it can be amplified by an a.c. amplifier. An output chopper may be operated in synchronism with the input chopper in order to rectify the amplified signal.
clear	An instruction that causes a designated variable, register or counter to be set to the all-zero state (i.e. cleared).
click	To press and release a button on a mouse or similar device or (as a noun) the action of pressing and releasing a button. Most mice have one, two or three buttons, so the prefixed forms *left click*, *right click*, *middle click* are often used.
click and drag	To click and drag involves holding a button down while moving the mouse; this technique is often used first to select (click) and then to move (drag) an object on the screen.
clipboard	A temporary storage location where a section cut or copied from displayed textual or graphical information is held until it can be pasted into another location.
close	To remove a window or dialog box or quit an application.
command file (script)	A file containing commands or other actions that could have been entered from the keyboard.

command button	In a dialog box, a control shaped like a pushbutton that carries out an action. A command button often has a label that describes the action it carries out (for example, Cancel, Help or Install).
comms (or coms, com)	Short for communications, as in datacomms, telecomms, comms equipment and comms link.
communication port (or com port, comms port)	Any external socket on a computer that can be connected to a communication line and used to exchange information with other computers or electronic systems. Each type of port has strictly defined connector types and pin assignments as well as electronic and logical signal protocols.
configuration	**1.** The particular hardware elements and their interconnection in a computer system for a particular period of operation. **2.** In configuration management, the functional and physical characteristics of hardware or software as set out in documentation or achieved in a product.
Control menu	A menu that contains commands you can use to manipulate the window. Application icons and some dialog boxes also have a Control menu. To open the Control menu, you use the Control menu box at the left of the title bar in a window or you select an application icon.
copy	To produce a replica of some stored information in a different part of the store or on a different storage device.
CR	carriage return
crosstalk	A signal that has leaked or "crossed" from one communication channel to an adjacent channel. This interferes with (causes errors on) the second channel. In brief, interference between two communication cables or channels.

cut	To mark a piece of text or graphical information in some way, read it into a temporary storage location and delete it from the original document. The information may then be inserted into a new location. It is often called a move or cut and paste by analogy with scissors and glue techniques.
database	**1.** Normally and strictly, a body of information held within a computer system using the facilities of a database management system. **2.** Colloquially, a collection of data on a subject however defined, accessed and stored within a computer system.
data chaining	Organizing a data file so that records are linked. A record may belong to more than one chain. Chaining allows access to records in a number of different sequences.
data entry	The process in which an operator uses a keyboard or other device to input data directly into a system.
data file	A file containing data, such as a file created within an applications program; for example, it may be a word-processing document, a spreadsheet, a database file or a chart.
default	A value that is used when no other value has been supplied. Nearly every application has defaults for something.
delete	**1.** To remove or obliterate a record or item of data, such as by overwriting data on disk or tape with new data or null characters. **2.** To remove permanently an object, such as a character, word, paragraph or graphic, from a document or to remove an entire document file from permanent storage.
deselect	To reverse the action of selecting an option, a range of text, a collection of graphical objects, and so on.

desktop	The screen background for Windows on which windows, icons and dialog boxes appear. In other words, an on-screen work area that uses icons and menus to simulate the top of a desk.
dialog box (or dialogue box, dialog, dialogue)	A simple window containing a title bar, a message and one or more response buttons. This kind of window will normally allow no other actions to take place until a button has been pressed. Dialog boxes may also contain more complex objects such as radio buttons, pull-down menus or scroll bars.
directory	A means of locating data items, usually files. A directory can be regarded as establishing a set of links between named data items and their locations in a direct-access storage device. A directory may contain the names of files and of other directories.
disable	**1.** To make a device inactive. **2.** To suppress the action of an interrupt.
DOS	Short for MS-DOS (Microsoft Disk Operating System).
double-click (or double click)	The double click consists of two clicks of the same button - typically the mouse - in quick succession; when performed too quickly or too slowly then the user's intention is misunderstood. Double-clicking carries out an action, such as starting an application.
dpi (d.p.i.)	dots per inch. Standard method used to describe the resolution capabilities of a dot-matrix or laser printer or scanner that is expressed as the number of dots that a device can print or display per linear inch.
drag	To move an item on the screen by selecting the item and then pressing and holding down the mouse button while moving the mouse.

drop-down list box	List of options for an entry that appears when you move the cursor to the entry field.
drop-down menu (pull-down menu)	A menu that appears on a computer screen when its title, often occurring in a menu bar, is selected by means of a mouse or other pointing device or an appropriate sequence of keystrokes. One or more of the menu options may then be selected in the same way, after which the menu will normally vanish.
edit	To create, modify or add to a document. Editing includes delete, insert, move, copy, search, replace, include another file, justify and paginate.
enable	To selectively activate a device, function or a value.
error	**1.** The difference between a computed, observed or measured value or condition and the true, specified or theoretically correct value or condition. **2.** An incorrect result resulting from some failure in the hardware of a system. **3.** An incorrect step, process or data definition in, for example, a program.
error message	A message that reports the occurrence of an error.
error routine	Any routine within a program that is entered as a result of some error condition having been detected. The actions taken by such a routine will be dependent upon the reliability requirements that the program is expected to meet and upon the strategy for error analysis and recovery.
execute	To carry out an instruction or program. This includes interpreting machine instructions, performing subroutines and applying functions to sets of parameters.

export	To introduce information to another location or to a different software program. Files that consist only of text can be exported in ASCII (plain text format). For files with graphics, however, the receiving system or program must offer some support for the exported file's format.
extension	The period and up to three characters at the end of a filename. An extension usually identifies the kind of information a file contains.
file	Information held on backing store (i.e. usually on magnetic disk or magnetic tape) in order (a) to enable it to persist beyond the time of execution of a single job and/or (b) to overcome space limitations in main memory. Files may hold data, programs, documents, pictures or any other information. They are referred to by filename.
file manager	A program for organizing a set of files.
file name (or filename)	An identifying character string used to refer to a file. The name can be generated by software or created by the user.
floating menu	The menu that appears when you press the right mouse button. The position of the menu is the current cursor position.
floppy disk drive (diskette drive, FDD)	A device that accepts flexible magnetic disks, i.e. floppy disks and reads or writes magnetic patterns that correspond to the data to be retrieved or stored.
gain	The increase in the amplitude of a signal, as of voltage, current, or power, that is produced by a circuit. Gain can be expressed as a factor or in decibels.

grid (mesh)	The result of subdividing a region in time and/or space into smaller subregions. A rectangular region in the x,y-plane can thus be divided into smaller rectangles by lines parallel to the x- and y-axes. The points of intersection of the lines are called the *grid* (or *mesh*) *points*. A discretization method replaces differential equations defined in a region by a finite set of equations, which define approximations to the exact solution at the grid points. The finite-difference and finite-element methods are important methods of this general type.
handshake (or handshaking)	An exchange of signals that establishes communications between two or more devices. The handshake synchronizes the devices and allows data to be transferred successfully. *XON/XOFF* is also called software handshake.
hard copy	A printed or otherwise permanent copy of data from a processing system.
hard disk	**1.** A magnetic disk consisting of a rigid aluminum substrate coated or plated - usually on both sides - with a magnetic material. **2.** A disk permanently mounted in its drive.
highlighting	A way of making a portion of a document stand out.
HIS	Acronym for **H**ospital **I**nformation **S**ystem.
hot key	A keystroke or combination of keystrokes that switches the user to a different program, often a terminate-and-stay-resident (TSR) program or the operating system user interface.
icon	A small picture used in place of another entity. Window managers often use icons to represent devices, wastebaskets etc.

idle	**1.** Operational but not in use. **2.** Waiting for a command.
import	The opposite to *export*. To bring something in from outside a system; to convert a file stored in one format to the default format used by a program.
initialization	The act of assigning initial values to variables before the start of a computation.
insert	**1.** One of the basic actions performed on sets. **2.** One of the basic actions performed on lists that places a new element into a list, not necessarily at one end or the other. **3.** An editing operation.
integer	A whole number, as opposed to a rational or real number. The concept of integer type is used for computer representation of a finite subset of the integers.
invalid	Not valid.
inverse video (or reverse video)	A display attribute in which one or more characters are displayed in the opposite contrast to the surrounding information.
justify	To achieve uniform vertical edges or columns of material printed or displayed on a screen. Information can be aligned along the left or right margin or centered between the margins. In the latter case, the space between words and/or letters is increased until the line fills the distance between the margins. If the spacing is excessive, it can be reduced by rewriting or by hyphenating words at the ends of lines.
LCD (or LC display)	liquid crystal display
LF	line feed

library	There are various different libraries, i.e. program library, link library, DLL, optical disk library, tape library and session library. A program or software library is a collection of programs and packages that are made available for common use within some environment; individual items need not be related. A typical library might contain compilers, utility programs, packages for mathematical operations etc. Usually it is only necessary to reference the library program to cause it to be automatically incorporated in a user's program.
LIMS	Acronym for **L**aboratory **I**nformation **M**anagement **S**ystem.
list	A set of words, numbers etc written one below the other. One distinguishes between the *head* and *tail* of a list as well as a *null list* (or *empty list*). The items in a list can be arbitrary in nature, unless stated otherwise. In particular it is possible for an item to be in another list, in which case it is known as a *sublist*. If a list has one or more sublists it is called a *list structure*. If it has no sublists it is called a *linear list*. The two basic representation forms for lists are sequentially allocated lists and linked lists, the latter being more flexible.
list box	Within an application window or dialog box, a type of box that lists available choices - for example, a list of all files in a directory. If all the choices do not fit in the list box, there is a scroll bar.
loop	**1.** A sequence of instructions that is repeated until a prescribed condition, such as agreement with a data element or completion of a count, is satisfied. **2.** A configuration of a local area network that consists of nodes connected serially in a ring topology. **3.** (local loop) The (twisted pair) connection from a switching exchange to the subscriber terminal.

MB (or Mb, Mbyte)	Symbols or abbreviations for megabyte. Usually 1,048,576 bytes (2^{20}); sometimes interpreted as 1 million bytes.
menu	A list of options that may be displayed either vertically or horizontally on a screen and from which one or more items may be selected using an input device.
menu bar	In either a text- or graphics-based user interface, a row, usually horizontal, of words or abbreviations that when activated by a pointing device or a sequence of key depressions cause some appropriate action. This may involve the display of menus.
menu bypass	A technique whereby expert users of a menu-driven program may avoid the process of stepping through a number of menus. This usually involves pre-empting the menus by typing in the selections before they appear.
menu-driven program	A program that obtains input from a user by displaying a list of options - the menu - from which the user indicates his/her choice.
metafile	A mechanism for storing and transmitting graphical information in a device-independent way.
mode	**1.** A term used in many contexts concerning the operation and use of a computer system. For example, conversational mode refers to interactive computer use; interpretive mode refers to a way of executing a language; there are addressing modes in instruction descriptions. **2.** A measure of location (compare mean, median and mode).
noise	Any signal that occurs in an electronic or communication system and is considered extraneous to the desired signal.

notebook (computer)	A computer about the size of a piece of A4 paper (about 20 by 30 cm) and a few cm thick with a hinge along the long side. Notebooks can have all the processing power and features of desktop computers. To increase their flexibility the pointing device is often a trackerball embedded in the keyboard rather than a mouse, which requires a hard flat surface to operate successfully.
off-line (or offline, Off-Line)	Of peripheral devices or files: not connected to the system or not usable. A device may be physically connected but off-line if the system has been instructed not to use it.
offset	Sustained deviation of the control point from the index (or desired) value.
online (or on-line, On-Line)	**1.** Connected to the system and usable. **2.** Online operation; Procedure such that results are available immediately, e.g. online help.
open	To instruct an application that a particular file is required for reading, writing or both. When a file is opened, its name is passed to the operating system, which locates it and checks that it exists and is available - creating it if necessary - before giving to the application status information and the location of the first record. Once a file has been opened for writing it is normally unavailable to other applications until it has been closed.
operator	**1.** A person responsible for the immediate supervision of the hardware of a computer system. **2.** A function that can be applied to one or more operands so as to yield a result. It is a symbol representing an operation to be carried out, as opposed to a variable, which represents a data value. *Arithmetic operator* is a type of operator appearing in an expression denoting one of the operations of arithmetic, e.g. +, -, * (multiplication), / (divide).

option button	A small, round button that appears in a dialog box. Within a group of related option buttons, you can select only one.
output	**1.** The result of data processing presented external to the system or the process of presenting the data externally. The output from a computer can be in a form for use by people, e.g. printed or displayed or it may be ready for input to another system or process, when it may be encoded magnetically or optically on a tape or disk. **2.** A signal that is obtained from an electrical circuit, such as a logic circuit. **3.** To produce a result or signal.
override	To prevent something from happening in a program or in an operating system or to initiate another response. For example, a user can often override and thus abort a lengthy sorting procedure in a database program by pressing the Escape key.
overwrite	To write data to a location (memory or tape or disk) and, in doing so, to destroy any data already contained in that location.
parallel interface	see also Centronics interface and parallel printer. A connection point that comprises a set of individual electric connections, each having a specified function, usually either data or control.
parallel port	An input/output socket on a computer or other device for a parallel interface. A parallel port on a computer is often used for a parallel printer.
parallel printer	A printer with a parallel interface that connects to a computer by means of a parallel port. The original parallel printer interface (Centronics) was unidirectional. Most parallel ports on current computers will support data transfers in either direction.

parity	In brief, parity is an error-checking procedure in which the number of 1's must always be the same - either even or odd - for each group of bits transmitted without error.
password	A secret group of letters or numbers that must be put into a computer before you can use a system or program.
paste	To insert the contents of the clipboard or the paste buffer into a text or graphics object at a desired point. Many applications have a Paste command on the Edit menu that performs this task.
PIF (program information file)	A file that provides information about how Windows should run a non-Windows application. For example, you use a PIF to direct Windows to run a non-Windows application in a full screen rather than in a window or to specify a startup directory.
pop-up menu	A menu that appears on the display when the user changes the state of a button or makes a selection from a menu bar. The menu item is selected by pointing to the desired entry before changing the button state back to the original state.
pop-up messages	The messages that appear when pop-up Help is used.
pop-up program	A program that is permanently resident in memory and "pops up" onto the screen at the touch of a key.
print quality	The characteristics of the printed characters on a printout (of a printer), e.g. characters per inch (CPI). In general, slower impact printers produce higher-quality print but the highest quality is available from laser printers.

program file	A file containing one or more programs or program fragments in source code or object code form.
prompt	A change to the contents of a computer display to indicate that input is required from the operator.
protocol	An agreement that governs the procedures used to exchange information between cooperating entities. More specifically, a protocol is such an agreement operating between entities that have no direct means of exchanging information, but that do so by passing information across a local interface to so-called lower-level protocols, until the lowest, physical level is reached. In general, a protocol will govern the format of messages, the generation of checking information and the flow control, as well as actions to be taken in the event of errors.
pull-down menu	A menu that is pulled down from the menu bar and that remains available as long as the user holds it open. Compare *drop-down menu*.
push button	A general term for the buttons on the menu bar, the scroll bars, the toolbars, in the dialog boxes etc (e.g. Option buttons, Command buttons) that are normally equipped with a title or picture and cause an action when pressed.
RAM	Acronym for Random-Access Memory, usually the main, impermanent memory of a computer.
raw data	Data in the form in which it reaches a computer system from the outside world: data that has not been processed.
read	To sense and retrieve (or interpret) data from a form of storage or input medium. The word is often used to qualify the meaning of a noun, as in read head.

read-only file	A file that can be read or copied, but not erased or modified. The protection is maintained by the operating system and in multiuser systems can be made to depend upon the category of the user. A file might be writeable by its owner, read-only to the owner's colleagues and inaccessible to everyone else.
relative addressing	Usually either of two ways to expand a short specified address. The first is *self-relative addressing* where the specified address is added to the address of the instruction (generally the current contents of the program counter) that contains the self-relative reference to produce a direct address. The second is *base addressing* in which the specified address is added to the contents of a base register containing a base address to produce a direct address.
remove	Data information can be taken away from the place where it is by e.g. replacing, erasing, deleting, cutting or rewriting.
run time	The time at which a program begins to execute, in contrast to the time at which it may have been submitted, loaded, compiled or assembled. The amount of time - elapsed time or processor time - used in executing a program is called the *execution time* or sometimes the *run time*.
save	In many applications the File menu contains two commands for saving files: Save and Save As. You use the Save command to save changes to an existing file. You use the Save As command to name and save a new file or to save an existing file under a new name. In brief, to write data (typically a file) to a storage medium, such as a disk or tape.

scroll	To move the information displayed on a screen in a vertical or horizontal direction: as information disappears at one edge new information becomes visible at the other edge or alternatively space is provided for the entry of new data. The scrolling action is perceived as a smooth movement. In some displays the movement is in discrete increments of one line pitch and this is referred to as racking. Scrolling is technically more difficult to achieve but eases simultaneous reading.
scroll box	In a scroll bar, the small box that shows the position of information currently in the window or list box relative to the contents of the entire window.
select	**1.** To initiate an action or enable a data path. **2.** To mark out a section of a document before performing an operation on it, such as copy, move or cut or before changing its attributes, such as font, color, margins or line spacing. The selection process can be done using the keyboard or dragging the cursor with a pointing device such as a mouse. The marked text is known as the *selection*. **3.** To indicate an item in a menu, menu bar, button bar etc with the selection cursor before initiating an action.
serial interface	A connection point through which information is transferred one digital bit at a time. The rate may be high, e.g. 10 megabits per second as in Ethernet or as slow as 110 bits per second via an RS232C interface. The term is sometimes applied to interfaces such as the RS232C and RS422 in which the data is transferred serially via one path, but some control signals can be transferred simultaneously via parallel paths.

serial port	An input/output socket on a computer or other device that is used for serial input/output, often making use of the RS232C standard. The physical port may have a 25- or 9-pin subminiature D connector or an RJ45 connector (which looks like a telephone connector). From the software, a serial port is usually treated as a device rather than a file.
session	The software program is based on sessions. The session contains the measurement parameters, the instructions for the instrument and the measurement data processing defined by the user. The user can create a new, save the current and edit an old session. Only one session can be edited at a time.
setup	The preparation of a machine for a specific work method, activity or process.
specimen	**1.** A small amount or piece of something that is taken from a plant, animal or human being, so that it can be tested or examined. **2.** A single example of something.

spreadsheet	A program that manipulates tables consisting of rows and columns of cells and displays them on the screen; the cells contain numerical information and formulas or text. Each cell has a unique row and column identifier, but different spreadsheets use different conventions so the top left-hand cell may be A1, 1A or 1,1. The value in a numerical cell is either typed in or is calculated from a formula in the cell; this formula can involve other cells. The ability of the cells to store text is used to annotate the table with column headings, titles etc. The common characteristics of all spreadsheets is the way the screen of a computer acts as a window onto the matrix of cells; if there are more rows and columns than will fit on the screen, then the spreadsheet can be scrolled horizontally or vertically to bring into view previously hidden rows or columns. To change a value it is only necessary to move the cursor into the required cell displayed on the screen and type in the new value.
status bar (status line)	In many kinds of display, including text and graphical user interfaces, a line of usually textual information about current status. A word processor status bar may tell the user what line and page is currently in use, if typeover or insert mode is in force and which font is currently selected, while a database status bar might have the current record number and field name and whether the display may be edited.
strikeout	Strikeout is a method of leaving a deleted section of printed or displayed text visible but clearly marked with a horizontal line through it.

string	**1.** A flexible one-dimensional array, i.e. a flexible vector, of symbols where the lower bound of the vector is fixed at unity but the upper bound, i.e. the string length, may vary. **2.** A type of input to a graphics system consisting of a sequence of characters. The usual input device is a keyboard.
submenu	A menu that appears as a result of the selection of a menu item. Menu items that cause further menus to appear rather than cause an immediate action to be performed are often indicated by ellipsis, by a right-pointing arrow or some other device, as in SAVE ... or SEARCH ▸.
Syntax (syntax rules)	The rules defining the legal sequences of symbolic elements in a language. The syntax rules define the form of the various constructs in the language, but say nothing about the meaning of these constructs. Examples of constructs are: expressions, procedures and programs (in the case of programming languages) and terms, well-formed formulas and sentences (in the case of logical languages).
tab	Short for tabulate, i.e. to lay out data and for tabulation character, a control character used when laying out data to control the movement of a print or display mechanism. The tab key may initiate the tabulation function or may be used for other control purposes.
template	**1.** The dimensions of the used microplate. The plate templates are expressed in units of 1/10 mm. **2.** A pattern that specifies a structure - i.e. a relationship between parts of a compound data object - from which instances may be made. The term is a convenient means of differentiating the structure specification from the declaration of individual instances of the structure.

template editor	The template editor in the Setup menu allows the user to create and modify plate templates.
text box	In a dialog box, a box in which you type information needed to carry out a command. The text box may be blank or may contain text when the dialog box opens.
timeout (or time out, time-out)	**1.** logoff procedure carried out if no data is entered on an online terminal; **2.** period of time reserved for an operation.
title bar	The horizontal bar (at the top of a window) that contains the title of the window or dialog box. On many windows, the title bar also contains the Control menu box and Maximize and Minimize buttons.
toggle	**1.** An electronic device with two states or a program option that can be turned on or off using the same action, such as a mouse click. **2.** To switch back and forth between two states. For example, the Num Lock key on an IBM-style keyboard toggles the numeric keypad between numbers and cursor movement.
toolbox	A set of software tools, probably from several vendors, not necessarily as closely related or providing as full coverage of the software life cycle as the *toolkit*. The set of tools in a toolkit is usually from a single vendor.

transformation	Transformation of statistics data means a change of scale used to improve the validity of statistical analyses. For data in which small values have smaller variance than large values a logarithmic or square root transformation is often recommended. For data in the form of proportions, a transformation from the scale (0,1) to an infinite scale is advisable before performing analysis of variance or regression analysis. Several transformations exist for proportions, such as the logistic or log-odds-ratio that is used in the analysis of generalized linear models. Appropriate transformations may be suggested by studying residuals in a regression analysis.
troubleshooting (or trouble shooting, trouble-shooting)	Solving a particular problem related to a project or system.
truncation	The decimals in a calculation are chopped - not rounded - in other words, removal of digits from a number so that it is a certain length. *Truncate*; **1.** To cut short. **2.** To give an approximate value to a number by reducing it to a certain number of digits.
user interface (UI)	The means of communication between a human user and a computer system, referring in particular to the use of input/output devices with supporting software. Examples include the graphical user interface (GUI) and command-line interface (CLI).
utility programs (utilities)	The collection of programs that forms part of every computer system and provides a variety of generally useful functions, including file searching, file copying and deleting, file directories, sorting and debugging, text preparation, program cross-referencing and various mathematical functions.

verification and validation (V&V)	A generic term for the complete range of checks that are performed on a system in order to increase confidence that the system is suitable for its intended purpose. This range might include a rigorous set of functional tests, performance testing, reliability testing and so on, in which case the term *verification*, *validation* and *testing (VV&T)* is more appropriate.
viewing	The mapping of scenes defined in a world-coordinate system to pictures seen from a particular view point, possibly with culling of the original scene and clipping of the area viewed.
warping	Distorting an image or texture to achieve some desired effect.
wildcard	A character that represents one or more other characters. Wildcards are widely used in commands and text searches. In filenames, you can use the question mark (?) to represent any single character and the asterisk (*) to represent any character or group of characters that might match that position in other filenames. For example, *.EXE represents all files that end with the .EXE filename extension.
wordwrap (or word wrap)	The ability of a word processing program or a text-editing program to break lines of text automatically to stay within the page margins or window boundaries of a document without the user having to do so with carriage returns, as is typically necessary on a typewriter.
workfile	Files with a very brief existence or where they simply carry information between one job and the next in sequence are called work files.
worksheet	In a spreadsheet program, a two-dimensional matrix of rows and columns that contains cells which can, themselves, contain equations.

zoom in / **out**	A possibility to see information either more closely and detailed (*zoom in*) by enlarging it or more remote and less accurately (*zoom out*) by diminishing it.

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Distributed by:

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